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The 'iPadagogy' of Reading: Exploring the influence iPads have on student achievement and perceived learning and engagement in middle school reading.

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Abstract

The increase in accessibility and demand for portable computers and tablets has seen literacy in schools begin a metamorphic transformation. This change has, and still is, driven by the advances in modern digital technology and its growing acceptance, popularity and need, as the division between home use and that found in classroom learning environments is steadily diminishing. With such advances in technology comes also the evolution of the format and style of reading text. The far-reaching effects of this 21st century technology is in its infancy as researchers and educators alike, seek to understand how effective and efficient the introduction of multimodalities are to the engagement, comprehension and achievement of readers. Schools and institutions are faced with evaluating the current issue as to whether or not the impending technology is beneficial to reading instruction and thus adapted accordingly or accept the current method of reading instruction as being sufficient. Before educators adapt new methods and distance themselves from decade long traditional reading orthodoxy, there must be evidence based research that exhibits improvement in comprehension (Grant, 2004).

Such research is supported by the New Zealand Ministry of Education who in 2014 invested millions of dollars over three years to fund teacher-led research, some of which was spent on improving literacy learning outcomes for students. Detailed literacy projects recently published by the New Zealand Council for Educational Research (McDowall, 2015) outline the importance recent literature-related research has been in providing a foundation of cumulative body of knowledge, linking teaching and learning and in addressing themes of strategic importance to education in New Zealand.

This small-scale experimental and exploratory mixed-methods research project documents the reading achievement of two groups of middle school students over a 5-week period, as well as the personal perceived learning and engagement experiences of the participants during this time. The study uses mixed methodology with quantitative data collected through quasi experimental testing and individual Likert scale survey. The quantitative data is supported by qualitative data, collected through four group interviews made up of three students- two groups from the treatment group and two from the control group. By focusing on the evolution of tablet computers into classroom environments and student learning, this research examines the extent of the influence iPads have on student's reading achievement at a middle-school year level as well as their personal engagement and learning experiences.

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I acknowledge my sincere gratitude to my supervisor, Dr Nigel Calder. Much of my academic journey spanning the last 13 years can be attributed to the guidance, teaching, wisdom, understanding and compassion you have shared, and for this I am truly grateful.

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The efforts of this thesis study are dedicated to my Mother and my late Father (1951-2014) who always encouraged me to 'just do my best'. Also to my loving, and encouraging husband Dan, who supported me in my aspiration to grow academically and better myself as an educator. Lastly, to my lovely, beautiful, life enhancing daughters Samantha and Caitlin, in the words of Henry Ford-

"*If you think you can, or you think you can't, you are right.*"

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Chapter One: Introduction

1.1 Study overview

According to Apple (2014) the iPad is starting to transform the way we teach and learn. Its powerful creative tools, interactive textbooks and host of apps make way for a multitude of learning possibilities. The introduction of the iPad in 2010 pioneered a new age in technological union and promised to bring affordable mobile technology into the classroom (Sheppard, 2011). Yet, while iPads have been continually and more consistently integrated into the daily lives of students outside of the school environment, according to Larsen (2009) it is important that teachers and researchers address the discrepancy between the types of literacy experiences students encounter at school (in the form of traditional print text, pencil and paper) and those they practice daily outside of the school environment.

Although paper based text has been the primary source from which people have previously read, the introduction of the iPad as an e-reader is fast gaining popularity. Due to this change in reading format, it is important that research is done in order to gauge if iPads, when used as a supportive and interactive technological tool, impact on student reading comprehension. This will then allow educators to adapt and enhance the reading curriculum to help meet the learning needs of their students in the 21st century.

1.1.2 e-Learning in the New Zealand Curriculum

In 21st century learning, the digital world of technology is ever changing. "However, the emergence of ubiquitous connectivity, increasingly mobile digital technologies, and the power of the internet pose the most profound challenges and opportunities the education system has ever faced." (O'Riley, 2014, p.2). Accordingly, within the New Zealand educational context the expectation is that students will complete their school years as: "Young people who are confident, connected, actively involved and lifelong learners" (Ministry of Education, 2007,

p.7). Traditional discrete delivery of knowledge has sidestepped to allow for a focus more in line with inquiry and process oriented approach to learning and key competencies, which can be further explained as the vital attributes for learning and living in the 21st century and beyond. An e-Learning action plan delivered by the Ministry (Ministry of Education 2006) ascertains that today's students need to be able to use ICT effectively over a range of curriculum areas and to be confident and capable in doing so. In terms of teaching, teachers who routinely use ICT in their classrooms are more likely to integrate it in order to meet their students' needs and simultaneously allow for greater levels of integration and collaboration (OECD, 2015; Wright, 2010). The New Zealand Curriculum, alongside a range of other national and international reports (Campbell, 2001; Johnson, Levine, Smith & Stone, 2010; Somekh, 2007) frequently highlight the importance of student interaction and collaboration which are reflected alongside other pedagogical actions such as co-operation, inquiry, amply opportunities to grasp new learning and a learning environment which encourages students and teacher reflection (Wright, 2010). All of which are outlined in the New Zealand Curriculum Key Evidence Document related to Ka Hikitia (Ministry of Education, 2008) and the Ministry's outline of the needs of a 21st century learner (Ministry of Education, 2006). "Increasingly, mobile devices equip students to take charge of their own learning in a context where learning occurs anywhere, anytime, and with access to a wealth of content and interactive tools. Digital technologies can excite and engage educators, students, their whānau and communities in learning" (21st Century Learning Reference Group, 2014, p.4) as well as diminishing international communication and learning boundaries, providing greater opportunities for distance learning.

1.2 Researcher orientation

Participating in research supports my incentive to gain new knowledge around effective and improved teaching practices, in order to motivate, engage and create purposeful learning experiences for my students. As a teacher of middle

school aged students, I identified a problem around the school I previously taught at, current reading comprehension programme for students in the middle school. According to the School's Annual Report (2012) almost a quarter (22%) of students from the combined three Year-6 classes were placed either below or well below for reading based on the National Standards for their year group. These statistics, in my view, highlight a situation that needs addressing. The ability to read is a fundamental skill incorporated into all other learning areas and is frequently utilized through life. Unfortunately, students who struggle with reading may face the severe consequence of a subordinate education (Burnside & Muilenburg, 2012). Personal misgivings about the effectiveness of the current middle-school reading programmes and use of traditional tools provided the impetus for this research project. My passion for teaching middle-school students is one I have held for the past 12 years of my teaching career. My predisposition is that teachers should be up-to-date with meeting the learning needs of the students from the 21st century and be able to adapt and accommodate their teaching in order to foster and engage students to learn important lifelong literacy skills for both the present and the future.

Previous postgraduate study in e-learning aroused an interest in academic research, particularly with the idea of invigorating and possibly improving my own pedagogical teaching practice. Knowing that the classroom in which I would be returning to after four years of maternity leave, would be one in with all students had personal devices was a further catalyst in my quest to gain knowledge and understanding of the effectiveness of these devices in the classroom. My enthusiasm not only extended to the need to acquire more knowledge and understanding, but when searching, finding limited literature in the academic field regarding devices used in mixed-method studies, inspired me to undertake my research and possibly add to the particular field.

1.3 Research context

This thesis documents an experimental and exploratory, small-scale, mixed-methods study which records the academic achievements, opinions and

experiences of 45 middle school students residing in Tauranga, Bay of Plenty, New Zealand. The research is located in Tauranga due to my direct connection and contact with the school and teachers involved in the research.

Student participants were selected from two middle school Year 7 reading groups. Out of a total of six streamed reading classes, the two 'middle ability' classes were chosen. Student participants from these two classes were chosen due to their access to personal iPad devices that were brought to school each day as part of being involved in a BYOD (bring your own device) classroom from the start of the year. The school at the heart of the study had currently implemented BYOD classes in three out of the six Year 7 classrooms.

For feasibility purposes, the research project has been limited to participants in one school.

1.4 Significance of the study

The iPad has proven to encompass many attractive attributes in its use as an educational tool to incorporate more interactive and meaningful learning (e.g., Cavanaugh, Hargis, Munns & Kamali, 2013; Melhuish & Falloon, 2010). I believe a more in-depth study of using an iPad not just as an e- reader but as a tool for encouraging and supporting reading comprehension will provide new knowledge around the overall effect iPads have on reading comprehension for my subjects. It is also relevant to acknowledge that due to the contemporary nature of iPad use in classrooms, the extent to which they effect student engagement and learning is not fully understood (Diemer, Fernandez & Streepey, 2012). Yet, recent research suggests that activities that incorporate iPads may promote active and collaborative learning which is an identified component of student engagement (Kuh, 2005) and associated with positive learning outcomes (Harper & Quaye, 2009; Kinzie, 2010 & Prince, 2004). This belief is in unison with recent research literature which relates student engagement with achievement in literacy learning (Hipkins, Wylie & Hodgen, 2007).

While it is difficult to define engagement due to its many elements, Akey (2006) suggests that engagement can be identified as the level of participation and interest a student exhibits in school based activities (for example, persistence, effort attention) and attitudes (also known as motivation, enthusiasm, interest and so forth). It is the emotional dimension of engagement that Gibbs and Poskitt (2010) identify as being student interest, attitude, enjoyment and the value they (students) have towards reading in which I wish to study. Through my research I wish to analyse data obtained from the students through surveys and interviews, about their perceived learning and engagement, from an iPad integrated reading comprehension unit and that which does not incorporate iPads. This data may also provide me with an insight into the different skills, strategies and dispositions students need in order to read and navigate digital text (Hutchison, Beschorner & Schmit-Crawford, 2012), as well as any common beliefs and attitudes the students may have towards reading and the set reading programme.

1.5 Aim of the Research

The key purpose of my research is to explore and gather information which may explain the possible influence iPads have on student academic achievement and student perceptions around learning and engagement in reading (specifically comprehension).

The knowledge I receive from the outcomes of my systematic research, will I expect, influence the way in which I (and possibly others) teach reading comprehension skills to middle school students. While many schools have embraced iPads in their classrooms, their use is still in a 'juvenile' stage. Wright (2010) suggests that teachers need time to learn how to get the best out of e-Learning tools in order to provoke more dynamic and effective learning environments. This leads to my role as a practitioner researcher to help myself and those of whom read my research to postpone judgement around the use of iPads in a reading programme. Also to uncover assumptions around their effectiveness and the possibility of providing a new way of seeing and

articulating practices, values and beliefs (Menter et al., 2011) surrounding the pioneering technology.

1.6 Thesis Overview

This thesis is structured in seven chapters. This first chapter has provided an introduction and overall understanding of what the research project is about. The following chapter provides a review of relevant literature on iPads in education, reading and engagement. It begins with an explanation of the Apple iPad and its features and incorporation into education whereby it has been adopted readily by students known in the 21st century as 'digital natives' and the effect this has had on learning pedagogy. It discusses the historical origins of reading and briefly covers the psychology behind the current education curriculum, including reviewing current research around effective teaching 'tools' in reading. The review also investigates student engagement in technology and the role it plays in students' achievement. Chapter Three outlines the methodology, research design and process. Through the studies focus and research question, the mixed methods philosophy that underpins the study is explored, as is a critical perspective. The research method alongside that of the process is elucidated as is an explanation of the quantitative and qualitative data analysis, credibility, dependability, transferability and reflexivity, followed by the ethical considerations and a description of the participants. Chapter Four presents the quantitative data research findings which are discussed in greater detail with respect to the literature in Chapter six. Chapter five analyses the qualitative data and presents findings from the participant interviews. Chapter 6 presents the discussion and reports the research question through four related themes: *Investigating the influence of iPads, Utilizing iPads as e-readers, The importance of engagement* and *Social collaboration vs. Academic co-operation.*

The final chapter, Chapter seven, provides a conclusion for the study, identifies the limitations of the study and offers recommendations that have emerged from the empirical findings.

Chapter Two: Literature Review

2.1 Introduction

This chapter begins with an introduction of the Apple iPad, cultivating discussion around its implementation into the 21st century education system with its current 'digital divide' between students and their teachers and issues around sound pedagogy. Following this, in-depth investigation will be presented on the historical origins of reading comprehension and the transition of research on reading comprehension instruction within the last 20 years. The final aspect of the chapter will identify the common trends and findings from research appertaining to student engagement; paying considerable attention to the influence technology has had on engagement levels for students in education, in line with this research project. Whilst the researcher has endeavoured to review research from a wide variety of academic literature, they acknowledge that the initial part of the literature review pertains recent research due to the genesis of iPads within the past six years.

2.2 The rise of the omnipotent iPad

2.2.1 Introducing the Apple iPad

Since its debut in January 2010, Apple's iPad has had a steady stream of tablet competitors within the global tablet market; Samsung Galaxy, Microsoft Surface Pro, Amazon Kindle etc. However, few tablet computers have ignited the urgent gadget covet like that of the iPad. In its short five-year history there have been more than 250 million sold worldwide (Kastrenakes, 2015). The original iPad 1 has since become obsolete by its successors iPad 2, iPad 3rd Generation, iPad mini, iPad 4th Generation and most recent, iPad Air, which boasts such features as a more lightweight (469g), thinner structure, faster processors, more powerful graphics and faster access to the internet than the previous models. The standard iPad uses a multi touch interface screen which is the user's primary mode of interaction with the device. The multi touch display accommodates

more than one person to use the iPad or a single user to touch the screen simultaneously, as well as the ability for the user to operate gestures such as flicking, stretching and pinching for relevant applications. An inbuilt accelerometer enables the iPad to sense movement and motion permitting the screen to rotate and/or in assisting in the measurement of speed and distance. In terms of connectivity, the iPad supports both Wi-Fi and Bluetooth networks, allowing the device to interact with other Bluetooth capable technology such as keyboards, headphones and speakers etc. Some iPad models come equipped with 3G cellular radio technology and are able to connect to the internet via cellular towers. 3G equipped devices also support the iPad in its ability to adopt technology which also encompasses 3G such as GPS. The iPad also exhibits an inbuilt speaker, microphone and camera and is delivered to the user with a variety of software enabling the user to access email, browse the internet, photos/videos viewing, music, online maps, calendar, note taking and online books (e-reader).

This research project specifically explorers the use of iPads and the applications (apps) running on the iPads, rather than other tablet devices, due to the intense and swift adoption of iPads among the younger generation of students and implementation of the device within New Zealand Primary, Middle School and Secondary classrooms.

2.2.2 iPads and the Education Prophecy

When it comes to education, according to Apple (2014) the iPad allows learners to be hands on and promises to transform the way people teach and learn through its versatile, creative tools, interactive textbooks, macrocosm of content and applications, portability and accessibility. Indeed, the adoption of iPads by education sectors is fast gaining popularity with acclamations to date praising the devices ability to allow students to generate (rather than simply consume) material, foster engagement, encouraging collaborative learning, and a greater flexibility to access information and content anywhere and at any time. (Murphy,

2011; Kucirkora et al., 2014; Henderson & Yeow, 2012; Maurguerra & Petocz, 2011).

While few would be inclined to disagree with the accelerated rate in which people have adopted the iPad into their everyday lives due to its exhorting technological beguile, from an educational perspective, there is much debate around the iPads auspicious prophecy. Technology and education, has had a turbulent and inconsistent relationship throughout history. Traxler (2010) describes the relationship as parasitic, whereby education has seemingly grasped at the talon of technological devices which were originally intended for business or individual lifestyle customers, and attempting to adopt them in various educational settings. Postman (1995) likens peoples' (educators included) relationship with technology, to that of religion;

"... people believe technology works, that they rely on it, that it makes promises, that they are bereft when denied access to it, that they are delighted when they are in its presence, that for most people it works in mysterious ways, that they condemn people who speak against it, that they stand in awe of it, and that, in the born-again mode, they will alter their lifestyles, their schedules, their habits, and their relationships to accommodate it…" pg. 19

Subsequently, the introduction of iPads into educational settings has resurfaced arguments against the use of technology in classrooms. According to Murphy (2011) adopting technology for technology's sake does not guarantee improved learning outcomes or an enriching educational experience.

A critical perspective arose in early 2000 as educational technology failed to live up to the expectations magnified by computer promoters, including those assured by Cuban (2001) and Skinner (2002) who fulminated the promised panacea technology offered in transforming instruction, making classroom

practices more co-operative and creative and increasing achievement. Such scepticism arose from research by Cuban & Kirkpatrick (1998) and Becker, Ravitz & Wong (1999) which yielded outcomes that reflected less than impressive results from the implement of technology to try and 'improve' teaching and learning. Investigation revealed that the research conducted by Becker et al., (1999) involved a national survey around the use of computers in classrooms. The study indicated that there was an inconsistent access to computers for not only students in various education institutions, but also between faculties. The study also acknowledged multiple variances between the competence levels and computer abilities of the teachers surveyed in relation to implementing computer technology in order to improve their teaching and student learning. Such perspectives held by both Cuban & Kirkpatrick (1998) and Becker et al., (1999) may be seen as deterministic and bias as they attribute technology as the sole effect in the unfulfilling promise to meet the needs of teacher and students alike, evading the possibility of other influences such as environment and ability.

This view is also shared by Schwartzmann (2006) who insists that blaming the technology conveniently shields critics from reflecting on their own pedagogical practices or their reluctance to incorporate new technological resources (so their) traditional teaching methods and ways of interacting with students remain unexamined, protected by blithe refusal to accommodate change. Penuel (2006) further elaborates on the pedagogical practices and states that much of the complexity of implementing technological innovation and initiatives in education is not due to not the technology per say, rather its unsuitability for teachers, lack of effective implementation and/or hostility to adopt it within the education institution.

Other considerations are that the research in which critics tend to support their side of the technology vs education debate generally tend to compare the two variables of technology with that of previous traditional methods, when it may be more beneficial to investigate how 'new' technology such as the iPad

supports teaching and learning in ways which would otherwise not be impossible (Murray & Olcese, 2011). Such is the foundation for this research project.

An alternative perspective is also held by Melhuish & Falloon (2010), Traxler (2010), Zur and Zur (2011) and Larson (2010) as they conclude that it would be detrimental to side-line technology (iPads) and ignore the potential they have to support students learning and engaging with information as part of real life, as they (students) make personal connections to people, ideas and knowledge in ways that are intriguing and exciting. This has particular relevance to 21st century learners as Melhuish & Falloon (2010) further elaborate that many youths described by Prensky (2001) as 'Digital natives' have preconceived notions regarding their education as being irrelevant due to educators (primarily digital immigrants) failing to utilise modern technology to support their learning. It appears that in some circumstances, prior critics have based their critiques along the lines of technology failing teachers and students, when further research may of been needed in order to gauge the level of discrepancy in learning experiences students encounter at school and those they practice daily outside of the school environment.

2.2.3 iPad or iFad?

A recent report from New Media Consortium (NMC) highlights that the tablet computer is one of the six emerging technologies with considerable potential for the area of education. The authors of the report Johnson et al., (2014) state that tablet computers have their own 'niche' in education partly due to their portability, ability to connect to other devices and capacity to facilitate learning both inside and outside the classroom. They also predict within the report that tablet computers are likely to enter into mainstream tertiary education institutions within the next 2 -3 years. However, as the report was based upon tertiary institutions it does not take into account the possible pedagogy that mainstream primary and secondary schools encompass, their overall curriculum

design and the relevant 'digital divide' affecting schools and other education institutions at the present.

An ever growing body of research investigating iPads and their effectiveness in raising student achievement has arisen since their implementation into various education institutions. Not surprisingly, a recent report by Apple (2014) includes research depicting iPads as showing "profound results" p. 2, in improving academic performance across a range of educational institutions from pre-school through to tertiary. According to the report, research results conclude that iPad use in selected educational settings improve academic performance when "measured by standardized test scores and other key student outcomes" p. 3. Whilst the report outlines many studies undertaken, in-depth research literature and methodology was omitted from the report. Notably, where suggested academic achievements increased through piloted studies such as those conducted at *Mineola Public School, Montlieu Academy of Technology and Cathedral School* (Apple, 2014), the quantitative data obtained from individual curriculum areas was from school records predominantly in subjects such as mathematics and reading. Such data 'coincided' with the implementation of iPads into the selected curriculum subject and was reported by the principal or other heads of school as the reason for the academic increase without in-depth investigation into other possible variables such as teachers, amount of exposure to the iPads, learning environment and so forth.

Despite iPads infancy into educational institutions, there has been substantial research around iPads improving reading experience (e.g., Fernández-López et al., 2013; Huber, 2012; Sloan, 2012; Zambarbieri & Carniglia, 2012), and fostering student learning and performance (see Churchill, Fox, & King, 2012; Fernández-López, et al., 2013; Isabwe, 2012). Yet, for each of the reported academic achievements Apple celebrates through its report, there is a seemingly lack of experimental research investigating the direct influence iPads have on academic achievement.

Scholarly research on the effects of iPad use on education through experimental measure is limited. Dhir et al., (2013) when reviewing the empirical and theoretical findings from investigating the instructional benefits of implementing iPads in classrooms, concluded that while iPads can motivate learners, overall the research on the actual impact of tablet use on learning is currently limited.

A recent study incorporated the use of iPad applications into a fifth grade mathematics programme. Carr (2012) conducted the small scale, quasi-experimental pre-test, post-test study on the effect iPads had on achievement when incorporated into fifth grade mathematics instruction. The study's theoretical framework was based upon philosopher John Dewey who focused his progressive approach on student needs. Dewey (1922) who stated the importance of students to 'learn by experience' and for educators to facilitate student centred learning experiences that were not only valuable and relevant, but also flexible in that of meeting the student's needs (Pieratt, 2010; Tzuo, 2007). Whilst the outcome of Carr's study identified 'no significant difference' in the mathematics pre-test and post-test scores between the two groups of participants, recommendations were made for future research, that qualitative data be collected alongside that of quantitative data. Certainly in the instance of the above study, qualitative data could have explored in-depth and provided more insight, knowledge and understanding into the experiences the fifth graders had from their own perspective using iPads in mathematics and the impact it had on their learning. Carr (2012) also acknowledged the limitations of the findings, as the students only had access to iPads during their mathematics lessons over 40 days. She implored for future research, students be allowed constant access to iPads 24- hours a day, seven days a week, in order to provide a more valid indication of their effectiveness.

2.3 Digital Natives in the 21st Century

"Welcome to the 21st Century. We are all immigrants in a new territory." - Douglas Rushkoff (1996)

2.3.1 The Rise of the Digital Native

The concept of incorporating technology into 21st Century learning is no longer foreign to those working in the wider education sector. During the turn of the 21st century, educators became aware of the educational and technological demands that journeyed alongside the turn of the century and the need to acquire new ways of thinking, teaching and learning. Part of the drive towards the need to impart certain 21st century skills and knowledge to students, was the notion that certain specific skills and knowledge must be learnt, in order to support students of this century, who are living in a society that is seen to be more complex and more information, knowledge and technology driven compared with that of earlier centuries. This new pedagogy of teaching and learning arose from the realisation that the education system taught in previous centuries was no longer adequate to support those who it was designed to teach, alongside the realisation that technology is being created and updated at a frenetic pace, and growing more pervasive and useful with each stride (McQuiggan et al., 2015, p. 1)

Questions have arisen in the reasoning behind the radical change in pedagogical movement where people and their exposure to technology through their environment seems to of had a vast effect on both their cognitive and physical actions. It appears that the rise of digital technology and its rapid evolution in society has attributed to the divide in individual living experiences and therefore is often perceived as being vastly different from those born before 1980. Prensky (2001) was the first to identify and label such a generation as *Digital Natives,* who due to the *rapid dissemination'* of digital technology, have been manifested in such an ubiquitous environment that they radically think and process

knowledge and information differently to those from prior generations; also known as *Digital Immigrants*. Many researchers supervised the 'Digital Native' bandwagon using different personas such as 'net-generation' (Oblinger & Oblinger, 2005; Tapscott, 1997) and 'Millennials' (Howe & Strauss, 2000).

With the emergence of the classification of the new generation came the imminent cognizance of a possible education bane, whereby digital natives who speak and breathe the language of computers and the culture of the web into which they were born were required to interact with digital immigrants who have never dealt with technology as naturally as those who grew up with it (Zur & Zur, 2011). Thus, the generation teaching (digital immigrants) thinks and teaches in such a way that does not support the thinking processes of the generation (digital natives) it is endeavouring to educate. In turn, this lead to an outburst of research, articles, books, videos, seminars and blog posts endeavouring to catechize how best to educate this new generation and their diverse learning styles (Dede, 2005).

2.3.2 The Digital Native Controversy

There are those who more recently, have chosen to question the characteristics and challenges Prensky (2001) identified digital natives having as part of their learning environment and different thinking processes. Koutropoulous (2011) and VanSlyke (2003) both question Prensky's use of statistics and use of over generalizations when identifying the amount of time digital natives were perceived to be spending on technology without providing clarification as to the context of the figures and other aligning influences such as socio economic background and country of origin. Prensky (2003) proceeded to single out and refute VanSlyke's (2003) criticism of providing 'over generalisations' with the clarification of the need to highlight a so called 'growing trend' that sees to become a threat to educators as it is a trend that "calls for tremendous changes in our teaching methods and requires our teachers to invent new approaches based on their understanding of how their students are changing" para.4.

Koutropoulous (2011) also questions Prensky's argument that recent research (although Prensky fails to provide reference to it) proves that the brains neuroplasticity is so that the brain adapts to the environment that it is in, so in a technology- infused environment the brain will adapt to better use the tools that are available to the environment. Koutropoulous (2011) argues that if this research is proven to be true, then on the flipside the brains of digital natives should also be able to adapt to using tools that are not technology driven and adapt, accordingly.

2.3.3 A new 'iPadagogy'?

Despite their different perspectives on what categorises a digital native and the implications that arise from this 'new' generation researchers (Boyd, 2015; Koutropoulous, 2011; Prensky, 2001; VanSkyle, 2003) are united alongside that of Zur and Zur (2011) in their belief, that educators need to change, adapt and utilise modern technology in order to engage students regardless of their technological skill, by creating intriguing & original opportunities that drive their (students) and empower them to learn. As iPads continue to evolve and pioneer mobile technology, Psiropoulous et al., (2016) believe that education has been thus far keeping pace in attempting to adapt such devices to the teaching and learning process, whilst simultaneously adapting the teaching practice for the affordances of the devices, in order to enhance the teaching and learning experience of the learners (Benton 2012; Crichton, Pegler and White 2012). Teachers internationally have started utilizing iPads for their educational applications, multi touch screen and multisensory capabilities in order to engage, introduce, practice and reinforce learning concepts (Castelluccio, 2010; Hill, 2011; Murphy, 2011; Price, 2011).

All-in-all, educators have a responsibility to set out to diminish the inequity in digital competency that has arisen due to the opportunities and exposure more privileged youth have to technology outside of the school environment. This is simultaneous with the belief held by Cowie and Williams (2013) who state

"*One of the roles of teachers now is to help students end up on the right side of the digital divide which will not only involve them in changing pedagogies but also modifying notions of what it means to be knowledgeable and literate and how future citizens will fully partake of their culture*" (p. *1-2).*

2.3.4 Reviewing 'iPadagogical' literature

As the iPad celebrates its upcoming sixth year since it was first introduced, early adoptees have been swift to be the antecedent evaluators of the device as an educational tool. Current literature is imbued with examples of comparative educational technology studies (see Koehler and Mishra, 2005; Oostveen, Muirhead & Goodman, 2011; Sheppard, 2011) which unavoidably depict the 'no significant difference' phenomena between the introduction of new educational technologies and traditional pedagogical approaches (Cochrane, Narayan & OldField, 2013). This is supported by Reeves (2005) citing previous literature by Bernard et al., (2003) who analysed literature of over 1000 research projects in e-learning which were synonymous in reporting no significant difference as well.

However, questions arise whether the 'lack of difference' phenomena are primarily confounded simply by a 'resistance to pedagogical change' (Cochrane, Narayan & Oldfield, 2013, p.146) rather than managing the unique leverage that iPads as a new technology have, to form pedagogical change (Laurillard, 2012; Reeves et al., 2010). It is no longer adequate for practitioners to commonly replicate 'old pedagogies on new devices' (Cochrane, Narayan and Oldfield, 2013, p.3). As Melhuish and Falloon (2013) state, in order for iPads to be used in educationally effective ways, there needs to be strategic and coherent support, particularly in the up skill of teachers by means of professional development (Mouza, 2008, para 17). Yet, questions arise of how professional development can assist teachers by providing knowledge around technology transforming pedagogy, when there is minimal evidence of it doing so (Cochrane et al., 2013; Ovens, Garbett, Heap & Tolosa, 2013).

Perhaps the answer lies within the iPads ability. According to Puentedura (2012), developer of the SAMR (Substitution, Augmentation, Modification & Redefinition) model, iPads have the capacity to accommodate learning through transformation via *Modification*-allowing teaching and learning to be 'redesigned', as well as through *Redefinition*- allowing for the creation of previously inconceivable tasks (Puentedura, 2006). When accompanied by the other two 'enhancement' aspects of the model *Augmentation* and *Substitution*, Davis (2003) infers that it may provide a catalyst for significant, powerful shifts in pedagogy and learning. As iPads afford the potential to engage and retain learners (de Jong, Specht & Koper, 2008; Wang, Liang, Liu, Ko, & Chan, 2001) and increase student participation and motivation (Jones, et al., 2001; Roschelle, 2003) they create a mechanism through which traditional lessons can be reconstructed and assist in the exploration of alternate forms of pedagogy (Ovens et al., 2013).

2.4 Reading Comprehension

2.4.1 Historical Origins of Reading Comprehension

By understanding the historical foundation of traditional views and pedagogy which influenced past reading instruction in schools, one can begin to comprehend how the 'models of reading' influence current comprehension curriculum, resulting in the way in which reading instruction is taught in New Zealand Schools today. The history and as such 'extent' in which reading comprehension was taught in schools in the late 19th and early 20th century, can be sort by examining the set suggestions outlined within the teacher training manuals and textbooks collated from the era. An observation made by Pearson (2009) depicts that the teaching of reading during the late 1800's and early 1900's, tended to have a great emphasis on the fluency and accuracy of texts, rather than the skill of comprehension. However, Pearson (2009) also notes some consistency dating back from the mid 1800 whereby authors attempted to promote comprehension within their text by including so called 'study aids' in the form of suggested vocab, phrases and questions teachers could use in

preparation for classroom discussions and/or quizzes (Elson & Keck, 1911; Gates & Ayer, 1933). In the early 1900's, book publishers and authors such as Longmans Green & Co introduced teachers to set lesson plans with suggested comprehension and vocabulary probes. It would appear that the theory behind the promotion and teaching of comprehension in schools during this time was for the teacher to use a range of questions and/or prompts in order to guide students in conversation during reading and in post reading discussions.

Perhaps such ridged instruction and at the time 'understanding' of reading comprehension was based upon the lack of knowledge surrounding the theory and as such, pedagogy of reading. Research conducted in the early 1900's by Edward Burke Huey (1908) and Edward Thorndike (1917) resulted in particular, Huey, undertaking a constructivist view of reading development. It was his theory that readers create meaning from what is written on the page by the author. Huey was staunch in his belief that the 'phenomenon' that was comprehension was simply 'un-analysable' and was also defiant in his constructive beliefs despite his presage of the emergence of other theories that would develop in the future quoting,

"...*that to read is to say just what is upon the page, instead of to think, each in his own way, the meaning that the page suggests*." (Huey, 1908, p. 349)

An alternate constructivist theory was held by Thorndike (1917). He argued that reading was like that of 'reasoning' and stated reading to be "*elements in a sentence, their organization…proper relations, selection of certain connotations and the rejection of others, and the co-operation of many forces*." (Thorndike, 1917, p. 323).

Thorndike (1917) likened the understanding of written text to that of a mathematical algorithm whereby the difference between a good reader and a poor reader was based around three factors, 1) Every individual word in the text had a meaning 2) Each word is 'weighed' in its importance of meaning by comparison with the other words around it and 3) the resulting ideas obtained from steps 1 and 2 are examined and validated to ensure they 'satisfy' the reader

or serve the intended purpose the author envisioned their text having on the reader.

While both Huey and Thorndike's theories of reading comprehension were based solidly around cognitive processes, their influence was evident in the emerging theories that followed by other researchers which again attempted to define 'what reading is' by largely agreeing, disagreeing or attempting to improve on Thorndike's psychology (Otto, 1971; Tolman, 1938).

2.4.2 The Influence of the Psycholinguistic tradition- A review

With the realisation that reading was a more complex process than early reading researchers had envisioned, and importantly not simply a set of skills to be 'mastered', there emerged a paradigm shift in the theory of reading. The decade spanning from 1965-1975 saw a considerable empirical and theoretical change to reading research. Noam Chomsky's (1957, 1965) research 'opened doors' in the introduction of psycholinguistics to reading. Chomsky (1957) created a psychological model labelling it as the *transformational generative grammar* which served as a model for human language processing, which conveniently and simultaneously also consummated as a model for reading comprehension. Researchers such as Goodman (1965), Smith (1971) and Bormuth (1966) were challenged to dismiss traditional ideologies surrounding reading research in favour of viewing reading from a psycholinguistic perspective by observing reading in its natural state, as an application of a person's cognitive and linguistic ability (Pearson, 1985).

Small scale research conducted by Stein and Glenn (1977) focused on using text comprehension as an analysis in an attempt to explain how reader came to understand the fundamental structure of texts (specifically narratives). Their study concentrated on the possible influence narrative texts had on elementary student's comprehension and memory. Other researchers such as Kintsch (1974) and Meyer (1975) elected to study the nature of informational traditional in text

comprehension. It was Meyer (1975) who identified through her work the need to classify and clarify a system of analysis which identifies categories of meaning for the consistency of future experiments.

Yet, while Kintsch's (1974) research set to distinguish a theoretically sound explanation around the important pre-behaviouristic ideas on memory and recall, there were limitations within his study due to his intentional failure to provide or attempt to provide a full processing model in which to base his experimental predictions upon (Dijk, 1976).

The research conducted by Meyer (1975), Stein and Glenn (1977) and Kintsch (1974) was conclusive from producing results that indicated story grammars provided explanations for story comprehension. Also conclusive was the analysis of the structural relations among the concepts in informational text providing explanations for expository text comprehension (Pearson & Camparell, 1981).

Though psycholinguistic research produced further knowledge in the understanding of reading comprehension, one important characteristic that the text analysis failed to acknowledge was the relationship between reader's epistemological knowledge that they bring to the text and the effect it has on their comprehension of the text. By focusing on the structure of texts rather than the ideational or content, researchers failed to get to the heart of comprehension, thus causing the teaching and learning of reading to inevitably fall into the influential movement of the schema theory (Pearson, 2009).

2.4.3 A Historical Overview of New Zealand Reading Instruction

According to Dole, Duffer, Roehler and Pearson (1991) educational practise of reading is, and always has been, heavily influenced by psychology. Numerous scholars have been salient to the tenacious relationship between psychological thought throughout periods of history and current instructional practice. (see Clifford, 1978; Glasser, 1982).

There is a lack of literature pertaining to the origin of the New Zealand Reading/Literacy Curriculum and the historical and theoretical foundation in which the past and present curriculums were developed from. According to Timperley and Parr (2008) in many western cultures, strategies have been implored for raising the literacy achievement within groups of similarly placed students, forming much of the focus of literacy policies, with varied approaches in the form of literacy programmes undertaken (Timperley, Annan & Robinson, 2008). This is at the discretion of the individual schools, unless the school is shown to have serious management or financial problems (Education Standards Act 2001). However, Timperley and Parr (2008) further elaborate that such reading programmes or practices are not available to the New Zealand Ministry of Education, due to New Zealand's self-managing school system which empowers and entrusts individual schools to make decisions around which reading programmes and practices are implemented and endorsed.

The year 1989 saw the introduction of New Zealand's new educational policy administrator group known as the Ministry of Education (Education Act, 080 Stat. N.Z. 1989) whose primary role was, and still is, to give policy advice to the Minister in government of the day, contributing to the Governments' goals for education (Ministry of Education, 2015). Yet, as a consequence of the newly appointed Education Policy System, individual schools' implementation of literacy teaching was governed by the school's 'Board of Trustees' who were responsible for overseeing not only the management, finance, administration, property and personal of the school, but also the curriculum (Education Counts, 2016).

The Ministry of Education understood the role research played in guiding teaching practice issuing the statement regarding a synthesis of research reviewed,

"*Our best evidence…is what happens in classrooms through quality teaching and through the quality of the learning environment generated by the teacher and the students."* (Ministry of Education, 2003, p.2)

In 2004 the Ministry of Education commissioned the 'Literacy Professional Development Project' (LPDP) focusing on improving teacher content knowledge in literacy, pedagogy and practice resulting in improved learning and achievement in literacy (McDowall et al., 2007). The added focus of literacy through effectively led professional developed was added in 2006 in response to findings from the embedded research (see Timperley & Parr, 2008).

Expansive and in-depth research conducted by McDowall et al., (2007) investigated the effectiveness of the Literacy Professional Development Project through a multi-method design, collecting data from interviews and questionnaires responses of school leaders and project facilitators as well as student achievement data pre and post intervention. Data was also collected from case studies from 12 schools over a two-year period. Expansive findings such as student achievement, practitioner learning and professional development around reading from the research, were published in a report from the New Zealand Council for Educational Research (NZCER) and the University of Canterbury. The report indicates that the research 'paved the way' by providing new knowledge around the relationship between student achievement and teacher professional development. According to McDowall et al., (2007)

"…the gains in reading achievement by students from schools in the LPDP, after taking into account expected growth and maturation, were greater than those that could be expected without the intervention." p.149

However, results showed that the mean shift in achievement over the 24-month period between pre and post-intervention testing for students in schools with the reading focus was only 0.53 of a stanine and that not all students made positive achievements in their reading achievement. In fact, over a third of all students in schools who began on stanine one did not improve at all, remaining on the same stanine throughout the project implementation and at its conclusion. Yet, many underlying factors were attributed to the lack of reading improvement such as facilitator skill and the need for schools to cater for students who needed more individualised and specialised teaching and

resources. Recommendations from the report address this by indicating further research is needed to "*inquire into the individualised and specialised teaching and resources required to ensure that those with the lowest literacy achievement can make progress comparable to their peers"* McDowall et al., (2007) p. 14.

2.4.4 New Zealand Curriculum- So what, now what?

In terms of the use of digital technology in the New Zealand Curriculum, an expected outcome is the appropriate use of digital technology to assist learning as well as implementing strategies which introduce and familiarize learning with digital technology in order to maintain New Zealand's future economic and social prosperity (21st Century Learning Reference Group, 2014; Ministry of Education, 2013). Indeed, the most recent *Statement of Intent* document endorses the potential of digital technology to accelerate changes to how students learn. The same document also promotes the ability for digital technology to change how teachers and educators interact and share knowledge, skills and information as well as the need to develop a comprehensive education strategy for 21st-century learning and digital literacy through a wide range of tools and (including mobile devices) and environments (Ministry of Education, 2013, p.27). While the *Statement of Intent* is clear in expressing how digital technology 'is to look' as part of 21st Century teaching and learning it is also important to acknowledge that digital technologies create "a shift in thinking and behaviour, and the consequent changes in expectations that are created, present fundamental challenges to many of the structures and roles upon which our traditional system is established" (21st Century Learning Reference Group, 2014, p. 35). Even during the writing of this thesis, three years into the Ministry's intent for 'developing a comprehensive education strategy for 21st Century learning and digital literacy" (Ministry of Education, 2013, p.27) schools are increasingly solitary in their approach to incorporating digital technology into their classrooms. While it is all well and good for the Ministry of Education to set intentions and objectives around digital technology, it is the teachers at the forefront of the classroom, the

facilitator, educator and supposedly technology adopter and driver who is often caught 'off guard' as implementation 'regulations' or 'suggestions' regarding digital technology use in the classroom is pressed upon the teacher putting pressure on them to change, which is not always personally welcomed (Schwartz & Schmid, 2012). This is in line with the motive of this study, to assist in the understanding of how computer based technology can influence learning opportunities (Hayes, 2007, p.385) which will undoubtedly impact this researcher/teachers attempts to integrate technology into her classroom, thus, "establishing a system that analyses the possibility of better learning pathways" (Kay, 2012, p.38) through student achievement or engagement outcomes.

2.4.5 Comprehending e-reader comprehension

The introduction of digital technology via devices in classrooms, alongside both the technology and literacy requirements necessitated to teachers via the Ministry of Education, demands that there is continual assessment and research into the best methods of improving reading achievement for students learning in a 21st century environment. In the past five years, traditional paper based text has been shifted to make way for electronic books (e-books or e-readers). However, if educators are to adopt such readers, due to the accessibility of most devices accommodating e-books, then this should only be considered if such readers lead to improving reading ability, compared with that of traditional printed text methods. Reading electronically impacts on the way an individual comprehends what is read as web text contains additional features, thus making it different from reading printed text (Sheppard, 2011; Sutherland-Smith, 2002). According to Sheppard (2011) "While the iPad had the features of an eBook reader, it also allows access to the myriad resources of the internet; allowing users to seamlessly switch from one text to another or to delve beyond the text itself" p.12.

Before educators break away from the orthodoxy of traditional reading methods and adapt to new methods in accordance with technological devices, there must

be evidence based research that shows an improvement for students (Grant, 2004). The employment of tablet technology to improve reading performance within educational institutions has been well researched in the short time they have entered into mainstream education (e.g., Coiro, 2011; Dundar and Akcayir, 2011; Saine, 2012). A study conducted by Dundar and Akcayir (2012) evaluated the affect tablet computers had on a group of Turkish fifth graders' reading performance. The small scale mixed-methods, quasi-experimental design allocated ten students who were randomly selected to be part of the treatment group, to have access to iPads during the duration of the study (which was not clarified by the researchers), while the control group read from traditional paper based text. Quantitative data was obtained through a reading performance test, focusing on reading speed and comprehension, followed by qualitative data from interviews of the participants. Dundar and Akcayir (2012) concluded that there was no significant difference in reading performance between the two groups of participants, however, they still considered tablets to be effective tools for reading electronic texts and ascertain the positive effect in had on students' motivation and attitude towards reading in general.

Another iPad study conducted by Sheppard (2011) explored student achievement and engagement in a total of forty-three boys aged 11-13, as well as the attitudes of the teachers involved in the classroom the student was conducted in. Like that of Dundar and Akcayir (2012) the participants were separated into two groups, however each group was exposed to both printed text and an iPad throughout the duration of the study. A mixture of quantitative and qualitative data was sort in the form of a fifteen question test administered at the completion of each text read to measure comprehension, followed by formal and non-formal interviews and surveys. Sheppard (2011) surveyed the student participants prior to the study commencing to gauge their attitudes' to reading, as well as conducting a Comprehension Progressive Achievement Tests in Reading (PAT-R) to determine the reading groups the students were to be placed in. Results from the comprehension tests revealed that again, like that if Dundar and Akcayir (2012) there was no significant difference of results between

the groups of participants for reading comprehension. Yet, Sheppard (2011) acknowledged that there were a large number of possible variables impacting upon the students learning throughout the study, such as iPad access (the iPads used had to be shared with other curriculum areas) and lack of internet connection. Quantitative results from the study indicated that the students found the iPads 'hugely engaging' (Sheppard, 2011, p.14).

Many of the studies investigating the effect iPads as e-readers have on student achievement, employ either a qualitative or mixed-methods approach. While the mixed-methods approach by Dundar and Akcayir (2012) and Sheppard (2011) yielded some interesting conclusions, there was some discrepancies within each of their studies. Dundar and Akcayir's study not only failed to inform the reader of the duration of the iPad implementation in their study, but also the sample size of 20 students may have contributed to the lack of significant statistical difference compared with that of the iPad itself. Sheppard (2011) employed a self-contrived test which may have limited the measure of latent constructs of interest with certain aspects of student proficiency (Koretz, 2002).

It is the intention of this researcher to create robust evidence of the positive or negative impact the iPad has on students reading achievement, when utilized as an e-reader and in making use of its unique innovative features in the form of applications.

2.5 Defining Engagement

Both researchers and educators alike agree that student engagement is essentially important in promoting achievement (Akey, 2006; Fredricks, Blumenfeld & Paris, 2004; Shin, Daly & Vera, 2007; Zepke et al., 2014) and in keeping students motivated to stay in school (Fredricks et al., 2004, Shin et al., 2007). However, the proliferate and overlapping constructs and definitions make it difficult to comprehend exactly what engagement is. In some forms of literature, engagement is identified by a number of factors including motivation, self-efficiency, and belonging (Fredricks et al., 2004; Gibbs and Poskitt, 2010).

However, this is refuted by Finn & Kasza (2009) who believe that engagement should have very clearly defined boundaries.

Shernoff and Schmidt (2008) attempt to define student engagement as *"The simultaneous perception of concentration, interest and enjoyment"* p.566. Yet, as Gibbs and Poskitt (2010) stipulate, the definition provided by Shernuff and Schmidt (2008) fails to reflect the concept of students intentional cognitive learning- that is, the cognitive processes that have learning as a goal rather than that of an intentional outcome (Bereiter & Scardamalia, 1989). Finn and Zimmer (2012) state that although there are various comparisons of engagement, the four dimensions of *Academic, Social, Cognitive* and *Affective* engagement appear frequently p.102.

For the purpose of this study, the researcher is drawn the dimensions as outlined by Finn and Zimmer (2012) and also to the comprehensive definition of engagement provided by Akey (2006):

"Student engagement can be defined as the level of participation and intrinsic interest that a student shows. Engagement in schoolwork involves both behaviours as persistence, effort, attention and attitudes (such as motivation, enthusiasm, interest and pride in success)." p.3

Engagement is described as a multi-faceted 'state of being', with scores of processes that ultimately arbitrate the level, depth and outcome and can be influenced by a range of internal and external influences (Appleton, Christenson & Furlong, 2008; Gibbs & Poskett, 2010; Newmann, Wehlage & Lamborn, 1992). One of these internal influences is the perception students' have in relation to the value they put on their learning, while external influences can be the presence of opportunities in which students are appropriately challenged to extend their knowledge and have success in their learning. Certainly, at the heart of Gibbs and Poskett's statement, and in conjunction with literature by Reschly and Christenson (2006) is the understanding that student engagement is not an attribute, but rather an alterable state of being which is impressionable by the actions of teachers, family and peers. This is significant, particularly when

there is vast research indicating that student engagement in school and learning decreases during the middle years of schooling (see Klem & Connell, 2004; Ryan & Patrick, 2001; Wang & Holcombe, 2010), and is evident in New Zealand schools through truancy, stand-down, suspension and expulsion rates which appear to increase dramatically from age eleven (Ng, 2006). Thus, as students become more critical about some of the teaching they experience resulting in declining attitudes, particularly in the core subjects such as mathematics and reading (Cox & Kennedy, 2008), it is the teachers responsibility to research and analyse the most effective methods in which to teach, and to incorporate the best tools available to them and the students, in order to develop within the students a desire to know more, evoke curiosity and provide lessons which create positive emotional responses to learning and school (Akey, 2006).

2.5.1 Engaging Technology

Recent literature concludes that when instructional technology has been employed in classroom studies, there has proven to be a positive correlation between the use of educational technology and student engagement (see Bouta, Retalis & Paraskeva, 2012; Chen, Lambert & Guidry, 2010; Nelson, Laird & Kuh, 2005). Allison and Rehm (2007) alongside Gibbs and Poskitt (2010), believe that incorporating technology and adapting what students may perceive as 'a leisure activity' into everyday lessons with deliberate learning purposes may be a tool in which learning becomes a more meaningful and relevant experience for less engaged students. This is due to the visual and multimedia functions that technology, and particularly devices, exhibit by aiding in engaging different senses, thus continuing to stimulate the students and keep them engaged in their learning. However, according to Livingstone (2009) and Selwyn (2009) digital learners lack many essential technology-related academic skills, such that their learning engagement with digital tools and resources is limited, sporadic, and unspectacular. Their learning engagement is often limited to game playing,

texting, and retrieving information from the internet while little involvement in producing and sharing self-created content occurs (Luckin et al., 2009).

Yet, research by Gurung and Rutledge (2014) rebuke the claims made by Livingston, Selwyn and Luckin et al. Gurung and Rutledge's study explored the technological engagement of digital learners across the context of their school and home life. The qualitative study included interviewing 183 students of mixed ethnicity, from an alternate public school who were in grades 9-12 (equivalent of Years 10-13 in New Zealand). Each participant was interviewed three times using open-ended and semi-structured questions which explored their lived experiences of using technology for both personal and educational purposes. The findings from the study showed that the two types of digital engagement- Personal digital engagement and Educational digital engagement, overlapped with each other. In turn this impacted in various ways, consequently outlining how digital learners engage with technology and subsequently concluding that there were blurred lines between home and school digital engagement (Gurung & Rutledge, 2014). Gurung and Rutledge state that for educators, it is important to understand and realize that digital learners have a predilection for blurring the boundary between PDE and EDE and consequently, the students within the study believed that such boundary blurring actually help them stay focused in their study (Gurung & Rutledge, 2014, p.99). They implied that further research should consider allowing participants to bring their own devices (BYOD) in order to be consistent between home and school technology device use, as well as further investigate if BYOD hinders or increases learning and achievement.

2.6 Summary

The literature analysed in this review demonstrates the need for research into how iPads as a form of digital technology, influence the reading achievement of 21st Century 'Digital Native' students and their perceived learning and engagement. If teachers are to adequately and effectively adopt iPads as a tool into their teaching practice, then literature indicates that there is a need for more robust quantitative data which sufficiently reflects on the effect iPads have

on students' achievements as well as further exploring engagement in reading by utilising BYOD to blur the lines between students' personal device use and that of which is used in the classroom. By investigating the influence iPads have on reading achievement and the perceived learning and engagement of the participants, this study endeavours to add to the limited amount of research in the field conducted within the mixed-methods paradigm within a primary school setting. In turn, this may provide further insight and clarity to the current dilemma teachers face as they seek to implement the best and most effective reading practices to increase student achievement. Whilst at the same time looking to employ ways in which to engage their students in their learning. The following chapter reviews the methodology this study adopts.

Chapter Three: Research Design

3.1 Introduction

This chapter describes the design of the study. It details the positioning of the research question within both the quantitative and qualitative paradigms, an explanation of the theoretical perspectives that have been used to underpin the study, as well as the mixed-methods approach used to conduct the research project. The chapter concludes with the consideration of the issues around the reliability and validity of the study and in the management of important ethical considerations.

3.2 Research question

Research can be described as "…a systematic and purposeful investigation" (Burns, 2000, p. 3) which, through a methodological sound process, seeks to inform practice by addressing gaps and expanding knowledge (Creswell, 2002) through the discovery of insight and non trivial facts (Howard & Sharpe, cited in Bell, 1999, p.2). Educational research can be distinguished from other forms of research by its focus on people, places and processes which are broadly related to teaching and learning and its intent on improving the practises of teaching and learning for the benefit of both educators and society at large (Mutch, 2013). Yet, it should be acknowledged that educational research is not only aimed at the improvement of teaching and learning, but also in personal and political improvement, so there must be "…a strong ethical and political underpinning to the framing of any research which is undertaken" (Griffiths, 1998, p. 67).

The research question at the centre this study is "In what ways do iPads when used as an e-reader and application, influence student achievement and perceived learning and engagement in middle-school reading?" Underpinning the central research question are three aspects to the inquiry:

- Do iPads when used as both an e-reader and as an application in a middle-school reading unit influence students reading achievement in terms of comprehension, accuracy and rate?
- In what ways does exposure to iPads as a 'tool' for both reading and in the completion of reading activities alter student's perceptions of how much they learn?
- In what ways does exposure to iPads in a reading unit engage students more?

This exploratory study aims to use both quantitative and qualitative data in measuring students reading achievement (quantitative) and their perceived learning and motivation (qualitative) in order to make an informed answer in regards to the possible influence iPads have on middle-school students and their reading.

3.3 Mixed methods research:

3.3.1 Defining Mixed Method Research

In the 30 to 40year history since the paradigm debate period, whereby many researchers (namely qualitative) were staunch in their belief that different assumptions provided the framework for both qualitative and quantitative research (see Bryman, 1988; Guba & Lincoln, 1989; Smith, 1983) there has been various excogitating definitions which have set to explicitly elucidate mixed methodology. Mixed-methods was originally defined as "...research which includes at least one quantitative method and one qualitative, where neither is linked to any particular paradigm." (Greene, Caracelli & Graham, 1989, p. 256). Later on it became apparent that mixed methods research was more than simply combining both qualitative and quantitative research methods as Tashakkori & Teddlie (1998) observed that mixed-methods research "...supervenes in all phases of the research process such as philosophical, position, inferences and interpretation of results." p ix). Almost a decade later mixed-methods research

has been more broadly defined as an investigation which encompasses the collection, data analysis, integration of findings and the drawing of inferences using both qualitative and quantitative approaches for the purposes of breadth and depth of understanding and correlation. (Johnson, Onwuegbuzie & Turner, 2007; Tashakkori & Creswell, 2007b). Although, the above definition does not specifically mention paradigms, further explanation is provided as mixed-methods may have paved the way to a 'third research paradigm' identified as the 'pragmatist paradigm' (Denscombe, 2008; Onwuegbuzie & Leech, 2007; Teddlie & Tashakkori, 2009). Pragmatism inveigles researchers to "apply an eclectic and pluralist approach to research" and encourages them to ...draw upon both positivistic and interpretive epistemologies, dependant on the purpose and applicability.....to regard reality as both objective and socially constructed" (Johnson & Onwuegbuzie, 2004, p. 17) and also allows the researcher to be free of mental and practical constraints imposed by the ''forced choice dichotomy between post positivism and constructivism'' (Creswell & Plano Clark, 2006, p. 27).

Recent times have seen a proliferation of the pragmatic paradigm, due to inveigle for researchers to employ multiple worldviews. This together with mixed-methodology is also accommodating to interdisciplinary research by allowing scholars to coalesce from various fields of study in order to *"employ multiple philosophical perspectives in order to guide their research."* (Creswell & Plano Clarke, 2011, p.17)

3.3.2 Mixed Method Philosophy

It is to be acknowledged that a researcher wishing to divulge into mixed methods research requires the use of specific skills, time and resources for the extensive data collection and analysis as well as the need to "attend to several important decisions." (e.g., Ivankova, Creswell & Stick, 2006, p.9-11; Greene, 2008, p. 14-17) in all stages of the research process.

An investigation into the effects iPads have on student achievement and perceived learning and engagement in reading calls upon both confirmatory and exploratory research, thus the use of mixed-method in order to address both the 'what' (numerical and quantitative data) and the 'how or 'why' qualitative aspects of the research question, as well as providing "... a more comprehensive understanding of the phenomena to be explained than single-method approaches" (Cohen, et al., 2011, p.24).

"It is suggested that more than one world view might be used in mixed-methods study...as worldviews relate to types of research designs they (worldviews) can change during a study and may be tiered to different phases in the project..." (Creswell & Plano Clark, 2011, p. 45). Likewise, methodological pragmatists (Patton, 2001; Reichardt & Cook, 1979; Tashakkori & Teddlie, 1998) believe that the philosophical disagreements surrounding the paradigm wars are not constitutional and that research methods are not inherently allied to specific philosophical positions. Such beliefs have gained substantial acceptance within the mixed methods research community in such a manner that pragmatism has been promoted as the most popular and appropriate philosophical stance for mixed-methods research (Biesta, 2010; Johnson & Gray, 2010; Maxcy, 2003; Tashakkori & Teddlie, 2003).

The initial stage of the research encompasses a representational ontology (that reality is self-evidently available and produces knowledge by means of immutable methods which can be acquired directly (Lemert, 2005a, 2005b)), an objectivist epistemological post positivist position (observation and measurement conducted by the researcher at a distance and impartially, (Creswell & Plano Clark, 2011), and a nomothetic deductive set of methodological procedures (generalized understanding through testing based on priori theory). It facilitates an experimental, scientific testing and proof approach to research, one which focuses on prediction (hypothesis), control of behaviour

and testing with “passive research ‘objects’- instrumental knowledge” (Cohen et al., 2011, p. 33).

The latter stage of the research is based around an idealistic/anti-positivism ontology (multiple realities construed by people in different ways, Cohen et al., (2011)), a constructivist epistemology based upon a close interactional relationship between researcher and subjects which leads to an idiographic, inductive and hermeneutic methodology focusing on “interaction and seeking to understand situations through the eyes of the participants” (Cohen et al., 2011, p. 32). This exploratory, phenomenological method within the study centres on collecting qualitative data about the subjects “belief systems and knowledge ability of themselves as individuals...” (Scott & Usher, 2011, p. 120).

The ‘practice-driven’ rather than idealistic nature of pragmatism focuses on utility, practical outcomes and heurism over the former ‘singular pursuit’ of the most accurate representation of reality, enabling researchers to find out what they wish to know regardless of whether the data and methodologies are qualitative or quantitative. (Cohen et al., 2011; Descombe, 2008; Feilzer, 2010).

3.3.3 Mixed Methods Research Design

According to Teddlie & Tashakkori (2009), mixed-methods research can adopt different designs. However, the current dilemma concerning mixed-methods researchers is the surfeit of designs currently in existence (Leech & Onwuegbuzie, 2009), partly due to the exhaustive nature and diversity of the research being greater than any systematic classification can adequately subsume (Maxwell & Loomis, 2003, p. 244) and the designs capacity to mutate into other diverse forms (Teddlie & Tashakkori, 2006, p. 13).

Various researchers have attempted to create mixed-method typologies (Greene, Caracelli & Graham, 1989; Creswell, 2002; Greene & Caracelli, 1997; Tashakkori & Teddlie, 2003b; Creswell & Plano Clark, 2011; Maxwell & Loomis, 2003; Johnson & Onwuegbuzie, 2004) and each is unique in its criteria and

dimensions. Yet, it is Creswell (2015) who identifies three basic 'core' designs and three advanced designs which in his view underline all mixed-methods studies. The basic designs include: a convergent design, an explanatory sequential design and an exploratory sequential design, while the advanced designs are: the intervention design, the social justice design and the multistage evaluation design.

The mixed-methods design that this research can be categorised by is the 'explanatory sequential design'. The intention of this design accommodates the conduction of research by "...beginning with a quantitative strand and then conducting a second qualitative strand to explain the quantitative results." (Creswell, 2015, p. 37).

Explanatory Sequential Design:

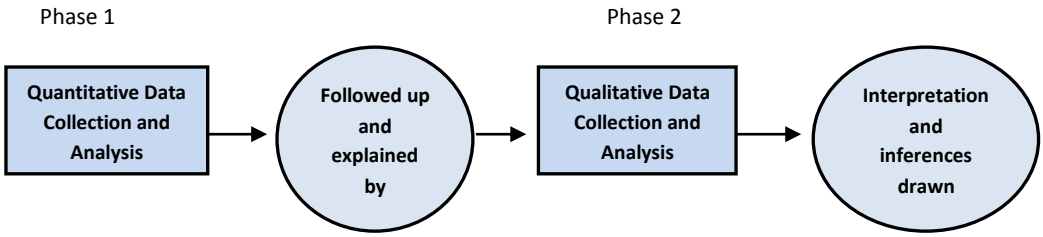


Figure 1. Diagram of the procedures in the two-phase explanatory sequential design. Adapted from Creswell et al., 2011 (p. 69) and Creswell, 2015 (p.38).

As shown in the above design, researchers collect and analyse the quantitative data in the first phase of the study. In the second phase researchers collect and analyse qualitative data in order to help explain or to elaborate on the quantitative data achieved from the first phase. According to Ivankova et al., (2006) the second qualitative phase should be built on the first phase, followed by the two phases connecting during the intermediate stage of the study.

The rational for this approach is that the quantitative data and subsequent analysis provides and overall understanding of the research problem, while the qualitative data and its analysis clarifies and attempts to justify the statistical results by exploring the participant's views in more profound depth. (Creswell, 2003; Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998).

The explanatory sequential design acculturates this research in collecting quantitative data obtained both from a standardized reading test and a survey in the first phase of the study, in order to validate the *null hypothesis* of there being 'no relationship between iPads (variable) when used as an e-reader and application and that of students reading achievement (variable)'. This will then be followed by the use of the qualitative data obtained during phase two from interviews to gain a greater understanding of the results procured from the quantitative data analysis.

Due to the greater importance placed on the quantitative aspect of the design the researcher will initially begin from a post positivism perspective specifically to measure variables and assess statistical results. Yet, while post-positivist philosophers argue for the 'continual objective' reality, they also have an affinity with the phenomenological, interpretive approach to research and highlight the importance of multiple interpretations of the phenomenon made by both the researcher and other parties involved in the research (Cohen et al., 2011) Post-positivist philosophers of educational research understand that although they seek to determine 'truth', it is not possible to describe the 'total reality' or all the truths- rather "Science seeks to develop relevant true statements that can serve to explain a situation that is of concern or to describe the casual relationships that are the focus of interest." (Phillips & Burbules, 2000, p. 600). Once the research has progressed to the second phase using qualitative data there will be a shift to using the assumptions of constructivism in the form of hermeneutic phenomenology, whereby the qualitative provides confirmation in the testing of truth relying on verification linked to the actions and events within the learning process of involving dialogue between researchers and the participants. (Pepper, 1942; Scott & Usher, 2011). As Creswell and Plano Clark state: "the overall philosophical assumptions in the explanatory design change and shift from the post positivist to constructivist as researchers use multiple philosophical positions (2011, p. 83).

3.3.4 Issues surrounding the Mixed-Methods Explanatory Sequential Design

Despite the mixed-methods explanatory sequential design being a popular choice amongst educators, the design itself is not easy to implement (Ivankova, Creswell & Stick, 2006). Consideration must be given to certain methodological issues which do not arise in single method studies. Such issues include the priority/ weight given to the data selection and analysis from both the quantitative and qualitative stages of the research, the sequence of the data collection and subsequently the stage within the research process that the quantitative and qualitative phases are connected and results integrated (Creswell et al., 2003; Morgan, 1998). In the explanatory sequential design, priority typically is given to the quantitative approach as it comes first in the study and often represents the major aspect of the mixed-methods data collection process (Ivankova, Creswell & Stick, 2006, p. 9). As indicated earlier in this chapter, this study gives priority to the quantitative aspect of the research, with the intention of the qualitative data to explain in more detail the initial quantitative results. As such, the quantitative data collection in the form of tests and surveys will be the initial data collected, which in turn, will inform the researcher as to the types of participants to be purposefully selected for the qualitative interviews phase and the types of questions that will be asked of the participants (Creswell, 2014). The stage in which the researcher integrates the results from both phases of the study is during the interpretation and discussion of results in Chapter 6. Interpretations and discussions within this chapter will specifically be reporting on the quantitative results first, followed by the qualitative results, with a third form of interpretation of how the qualitative findings help to explain the quantitative results. Issues can arise when the researcher begins to attempt to 'merge' the two databases together, however, the researcher acknowledges that care will be given to not merge the databases together, rather integrate the quantitative and qualitative results while discussing the overall outcomes of the study and drawing on the implications,

resulting in a higher quality of inferences (Ivankova, Creswell & Stick, 2006; Tashakkori & Teddlie, 2003).

3.4 Critical research perspective

3.4.1 Introduction

A critical view towards research is vital as it strives "To bring about a more just egalitarian society in which individual and collective freedoms are practiced and deems to eliminate the cause and effects of illegitimate power" (Cohen et al., 2011, p.32). Its primary purpose is not to generate knowledge of the world as it is and appears, rather to recognise and expose practices and beliefs that restrict human rights such as freedom, justice and democracy by uncovering the *interests* at work in particular situations and to employ action that bring these about (Cohen et al., 2011; Scott & Usher, 2011) and is of particular importance in revealing the workings of social structures within educational setting which are responsive to the needs of diverse student groups (Shipway, 2010).

3.4.2 Critical Realism in Mixed Methods Research

The value of realism does not evolve simply from its affinity with various approaches to research or from its pragmatic orientation to methods. Realism has vital implications for the conduct of research (Maxwell & Mittapalli, 2010, p.151). While this mixed-methods research does somewhat accommodate both positivistic and interpretive characteristics, it is also largely unadulterated from the scrutiny which attaches itself freely to both the independent positivist and interpretive paradigms. Such criticism has arisen from the two individual paradigms inability to provide complete accounts of social behaviour, as well as their tendency to neglect the political and ideological contexts of educational research through their 'technisitic' behaviour. In other words, the researcher seeks to comprehend and render more efficiently an prevailing situation rather

than to question or transform it (Cohen et al., 2011). Mixed-methods research such as this can also enable a more comprehensive understanding of the phenomena to be obtained as it recognizes the similarities between the different philosophies and epistemologies in quantitative and qualitative traditions, rather than the differences that keep them apart (Cohen et al., 2011; Onwuegbuzie and Leech, 2005).

3.4.3 Applying closed system practices in open system settings

Positivist research in education us usually focused on 'objectivity' and as such attempts are made to replicate the controlled conditions (such of that in a laboratory) in the chaotic environment of the classroom with the intent of isolating and controlling certain variables, observing specific phenomena in isolation and then drawing the constant conjunctions between cause and effect (Shipway, 2010). However, such researchers (Collier, 1994; Corson, 1997; Shipway, 2010) state that the exact nature of critical research argues against this type of research in an educational setting due to the open system and counter tendencies that exist which are beyond prediction, yet will prevail (Collier, 1994, p.210). Complications also arise in the process of theory development and in the questioning of the data validity, which as the replication of test conditions and quantitative data generation within an educational setting are in principal 'impossible' the research needs to be concerned with explanation rather than prediction.

3.4.4 Misapplication of quantitative data methods- Majority rules

A critical research perspective also highlights the validity of quantitative data in education, certainly when such data is concerned with decision making. While a common positivistic stance may argue that a claim of truth has more significance if it is supported by quantitative rather than qualitative data, a critical realism perspective is curt in denouncing such claims. Critical realism argues that

quantitative 'tool's cannot take into account participant's values or reasons (Shipway, 2010), location in culture and history (Scott & Usher, 2011), religious concepts, political and social ideals (O'Connor, 1973) that are an inherent aspect of open systems in the social sciences and as a result "important environmental values and other aspects of educational life can be ignored during the data collection" (Shipway, 2010, p. 164).

Likewise, Collier states: "...that as soon as mathematical calculation is taken as desideratum, qualitative distinctions which are crucial in the form of causal and moral are lost sight of" (1994, p.252). One such effect of the loss of sight in education is that the rights and values of particular individuals and minority groups can be ignored, especially in indigenous cultures which live precariously alongside more dominant European cultures, yet are often observed as being rigorously mentalist and exclusionary in the views of the world and logic they embed. (Shipway, 2010).

Another cause for concern is highlighted by New Zealand researchers Smith (1996, 2000) and Elley (1996) in regards to the effectiveness of quantitative methods in literacy research. As Smith and Elley state:

" New Zealand Teachers assume that learning to read is best when it is informal, natural, spontaneous, continuous and enjoyable. So the experimentalists' findings are inevitably difficult to relate to New Zealand classroom programmes." (1996, p.89).

This is further supported by Smith (2000) who implores:

"Evidence (quantitative) has to be weighed against anecdotal evidence of a sustained body of qualitative research that supports the use of context as the primary cue to be used by (beginning) readers" p.141-142.

There is much scepticism around quantitative and experimental research with its heroic failure of scientism offering a distorted view of reality (Collins, 2003; Pawson & Tilley, 1997; Sayer, 1992) and its incompatibility with realism; however, one cannot ignore the revolutionary work by methodologist Donald

Campbell (1988) and his development of experimental methods in social research. Campbell (1988) can be perceived as explicating a 'critical realist perspective' (Maxwell, 1990; Maxwell & Mittapalli, 2010; Weisner, 2005) in his "...explication and application of theory of social science validity...as a progressive step towards a more complete theory of science" (Overman, 1988, p.i) and birthing support for scientific research in education from the likes of Mayer, (2000), Sokal and Bricmont (1998) and Cizek (1997). Shipway (2011) argues that empirical studies have made valuable contributions to understanding the process of teaching and learning, however the knowledge gained from such studies need to be balances with, rather than in opposition to, the contextual aspects of education p.164. Nevertheless, it appears that the most detailed argument 'for' experimental research is presented by Shadish, Cook & Campbell (2002) who state "The unique strength of experimentation is in describing the consequences attributed to deliberately varying a treatment. We call this *casual description*. In contrast, experiments do less well in clarifying the mechanisms through which and the conditions under which that causal relationship holds-what we call *casual explanation…*a delicate balance is needed between casual description and casual explanation… yet most experiments can be designed to provide better explanations than is the case today" (p. 9-12).

It is important to acknowledge that due to the technical, unreflective and fixated nature of quantitative experimental research in educational settings and its obsession with technique, the researcher must be critical and coherent in ensuring that the rigours technique does not disqualify or subordinate considerations of practical (and moral) import into their own social reality (Collins, 2003). Critique and as such criticism is a vital way of resisting an over preoccupation with technique...and the way it establishes its way into diverse forms of enquiry...and wider expanses of everyday life (Barrett, 1979; Collins, 1991).

3.4.5 Interpreting the Perceptions

The elimination of emotions, beliefs, values and/or the attempt to deal with these is one of the main issues qualitative researchers attribute to quantitative research. Qualitative researchers argue that mental phenomena are "…not simply abstractions from behaviour or constructions of the observer" (Maxwell & Mittapallii, 2010, p. 156) and as such are part of reality. Sayer (2000) and Putnam (1990) insists that realists understand the importance of recognising that reality incorporates the importance of meaning as well as physical and behavioural phenomena (as having explanatory significance) and the substantially interpretive nature of our understanding of the former. In essence, realists are not dualists, presupposing two different realms of reality, rather, "an acquiescence in a plurality of conceptual resources of different and mutually irreducible vocabularies...coupled with a return to 'naturalism of the common man.'" (Putnam, 1999,p.38). Therefore, unlike the interpretive description of knowledge making through 'multiple realities', critical realism rejects the notion of multiple realities in respect to individual and incommensurable worlds in favour of the concept that there are various valid *perspectives* on the world, which are held by both the researcher and the people in whom the researcher studies as part of the world we wish to understand (Maxwell & Mittapallii, 2010). Critical realism acknowledges that it is the understanding of these perspectives that is more or less correct (Phillips, 1987).

While the qualitative aspect of the research does inhibit an interpretive/hermeneutic approach in the acquisition of data, this in its own right is not free from criticism either. An interpretative approach in research focuses on individuals' everyday experience and ordinary life as its subject matter and is interested in the establishment of how meaning is constructed and social interaction is conferred in social practices. (Scott & Usher, 2011). While constructivists favour the subjective nature of the researcher when undertaking social research (which deals directly with the experience and specific contexts of people) it denotes the belief that individuals' beliefs and perspectives can be/are

influenced by their social and physical contexts. Such beliefs have become the source of critique and viewed as a form of limitation and validity to qualitative research. As constructivism emphasizes the way in which social reality is composed out of a manifold of 'subjective meanings', the interpretive approach neglects questions surrounding the relationship between individuals' interpretations and actions and external factors and circumstances (Carr & Kemmis, 1986). A realist perspective insists that "not only are individuals' perspectives and their situations both real phenomena, but they are separate phenomena which causally interact with each other." (Maxwell & Mittapallii, 2010, p.157). Certainly this researcher attests to the critical proposition that the perceptions and values held by the participants in regards to their engagement and philosophy of their own reading ability are influenced by an array of phenomena not just from their own objective personal influences (as such, meaning, beliefs and motives) but also the social and physical contexts of their peers and/or teacher, and the physical confines of the classroom/school environment.

This researcher resonates, to a degree, with Karl Poppers philosophy of science and agrees with Popper's (1963) notion of human fallibility in the search for knowledge as being an epistemological 'Copernican revolution'- in that the researcher cannot obtain certainty but through her research strives to improve her personal teaching action through the elimination of mistakes, arriving at a better (but not perfect) solution in teaching and student learning (Swann and Pratt, 2004).

3.5 Research design

Research Methodology is structured within the design of the study and is influenced by the specific theoretical paradigms, strategies and perspectives that fortify the research. The principal process of the research design is "to employ

the methods that optimally serve the theoretical perspective of the researcher and the ultimate purpose of the study." (Creswell, 2006, p.216). Research, particularly that of literacy research should set to develop a class of theories about the process of learning and the means that are designed to support learning (Cobb, Copnfrey, diSessa, Lehrer & Schauble, 2003). Slavin (2002) contends that in order for educational research to 'take hold' and produce revolutionary desired outcomes intent on developing sound educational policies and teaching, it is vital that the foundational research design meets the highest standard and vigour.

The need to use three distinct methods arises from the two distinct phases of data collection in this study.

3.5.1 Quasi- Experimental Design

The key feature common to all experiments, is to consciously alter a variable so as to discover subsequently what happens to something else- to discover the effect of speculated causes. Likewise, quasi- experiments share an analogous purpose in "testing descriptive causal hypothesis about manipulative causes within similar structure details, such as the presence of control groups, and pre-test measures to support a counterfactual inference about what would happen in the absence of treatment" (Shadish, Cook & Campbell, 2002, p.14). However, due to the inability to achieve random assignation of participations, a quasi-experimental design was seen as more fitting for the research at hand. Quasi-experimental research is referred to as the when and whom of measurement with the lack of control over the when and whom of exposure Campbell and Stanley (1963).

As a method of obtaining quantitative data, the quasi experimental design of pre-test, post-test non-equivalent group is one of the most commonly used designs within educational research as it allows the researcher to "approximate the conditions of the true experiment in a setting that does not allow for random

assignment of participants to treatment and control conditions... and is often more convenient and less disruptive to the participants and the researcher" (Rovai, Baker & Ponton, 2013, p. 89) and fits in with the experimental paradigm as it conceptualizes the two important features of experimental causes (treatments) alongside that of experimental effects.

Experimental research can be broadly described as an empirical investigation under controlled conditions which is designed to examine the properties of and relationship between specific factors, in order to demonstrate a known truth, or to examine the validity of a hypothesis. Experimental social research is seen as a model of good practice in developing confidence that a certain knowledge claim can be determined as true or false by collecting evidence in the form of objective data of relevant phenomena (Denscombe, 2010; Mertens & McLaughlin, 2004; Muijs, 2010). A quasi-experiment is a form of experimental design which Kerlinger (1970) notes as a 'compromise design'. Quasi literally means 'as if' in that it is a variant of a true experiment as it does not possess certain key features identified in that of a true experiment yet "it is an apt description when applied to educational research where the random selection or assignment schools and classrooms if often impracticable" (Cohen et al., 2013, p. 322).

Thus was the case with this research as due to the pre-determined variable of half the middle-school (Year 7) student population having personal access to iPads and the other half not, therefore the researcher was unable to delegate a random assignment of participants to the study.

Quasi-experimental design: the pre-test post-test non-equivalent design

Experimental group (iPads)	$0_1 \quad X \quad 0_2$

Control group (No iPads)	$0_3 \quad X \quad 0_4$

Figure 2. A simple diagram of the procedure in the above quasi-experimental design. Adapted from Cohen et al., 2011 (p. 323).

As described by Cohen et al., (2011) the dashed line which separates the paralleled rows in the above diagram (*figure 3*) indicates that both the experimental and control group have not been equated by randomization- i.e. are non-equivalent. The researcher endeavoured to make both the experimental and control groups as equivalent as possible by using population samples that were as alike as possible (Kerlinger, 1970). This was done by researching a sample of the population who were within the same reading capability groups, and was done as the ability to strengthen the equivalent of the groups through matching was not possible.

3.5.2 Limitations of quasi experimental design

Perhaps the most widely recognised limitation to quasi-experimental research designs, resigns in its lack of randomized participant assignment. According to Shadish, Cook & Campbell (2002) quasi-experimental design features usually create less compelling support for counterfactual inferences. This has particular relevance for the researcher as she acknowledges that the control group may differ from the treatment (iPad) condition in other systematic manners, other than the exposure to iPads.

Consequently, each manner could then be considered alternative explanations for the observed effect such as, '*extraneous variables'* (Whitley & Kite, 2012, p.186). In order for the researcher to gain a more valid estimate of the treatment effect, it requires her to essentially preclude each plausible alternate explanation to the best of her ability, followed by the use of logic design and measurement to assess whether each variable is operating in a manner that may explain any observed effect (Shadish, Cook & Campbell, 2002). Such implications can be likened to Popper's (1959) philosophical 'falsification' claims, whereby all conceivable alternatives to the explanation must be eliminated before the proposed explanation can be accepted (Peters, 1987, p. 218). Shadish, Cook & Campbell (2002) state that quasi-experimentation is 'falsifictionist' in that it

requires researchers to identify a casual claim and then generate and examine possible alternative explanations that may falsify the claim p. 15.

The difficulties, and as such 'limitations' reside in the knowledge, truth and understanding that extraneous variables are never enumerable in advance and vary depending on the context studied. For the interests of this study, the researcher understands that it is neither feasible nor desirable to out rule all interpretations of casual relationships identified through possible extraneous variables. Instead the researcher acknowledges that only identifiable alternatives that she personally considers as plausible will constitute the focus of the causation.

3.5.3 Causation approach

The objectivist approach towards realism (the world exists and is knowable as it) and the identification of conditions or relationships which exist within it, allows researchers to use mathematical models and quantitative analysis to measure the abstraction of reality through determinism or causality (cause and effect). Accordingly, Cohen et al., (2011) believe that if rival causes or explanations can be eliminated from the research, then clear causality can be established and the model can explain outcomes, thus the ability for quasi experiments to determine cause and effect.

Educational researchers are concerned not only with what works, but why, how, for whom, and under what conditions and circumstances (Cohen et al, 2011, p. 54). Causation is used in social science as a fundamental way of understanding our world (Morrison, 2009) and is deeply entrenched in our everyday language (Pinker, 2007) as it seeks to help us, manipulate our environment and understand, inform, predict, evaluate and establish what works in our lives (Lewis, 1993; Salmon, 1998).

Causation involves a change or transition (Belnap, 2002; Muller, 2005) and takes place in the context of a set of specific circumstance conditions that when combined; bring about the effect (Morrison, 2009). Philosopher David Hume

identified four conditions of cause and effect as *temporal priority, special contiguity; constant conjunction and necessary connection* (see Beebee, 2006; Hume, 1955; Kail, 2007). Hume (1955) believed that analysis is regularity and deterministic, in other words "if the necessary and sufficient conditions obtain then the effect follows" (Morrison, 2009, p.875). Many researchers (see Mackie, 1993; Kim, 1993; Lewis, 1993) argue that one distinguishing indication that causation is taking place or has taken place is the presence of counterfactuals within the causation, as such, if X (cause) had not happened then Y (effect) would not have happened.

However, Maxwell (1996, 2004) argues that although this may be true in the physical world where isolated causes and effects can be identified according to universal laws, in the social world due to its non-deterministic, mechanistic situation; human interaction, conditioning, motives, reasoning and intentions alike, are not susceptible to such straightforward modelling.

Likewise, researchers (e.g., Cohen et al, 2011; Goertz, 2002; Morrison, 2009) are of the understanding that perhaps in social science research, a deterministic view of causation may be better replaced with a probabilistic view, in other words the deterministic view of *certainty* is replaced with the probabilistic view of *likelihood.* The central idea behind probabilistic theories of causation is that there must be evidence that if a cause is a cause of an effect, then that cause must be 'more probable than not' or raises the probability of the effect (Hitchcock, 2002; Mellor, 1995). Certainly it is the argument of this researcher that probabilistic causation is a more realistic approach to the research, due to the uncertainty of being able to successfully identify the cause (iPads) as being the singular producer of the effect (reading achievement) against several other contextual, environmental and circumstantial variables or *imperfect regularities* (Morrison, 2009, p.945). As with probabilistic causation the researcher is unable to identify for certain that iPads are the singular cause in the effect of reading achievement, and acknowledges that she will produce incomplete knowledge

from her findings, thus producing causal knowledge which is inductive and inferential (Salmon, 1998).

3.5.4 Constituting the Cause

Despite causal relationships being a predominant attribute to everyday life, a precise definition of 'cause' eludes many a philosopher. It is not this researcher's intention to attempt to define the definition of cause, rather, to highlight specifically what constitutes the place of iPads as the cause within the research.

The researcher acknowledges that iPads within the research design are part of a 'constellation of conditions' (Shadish, Cook & Campbell, 2002, p. 4) without which, reading comprehension and perceived learning and engagements levels in middle school students reading may remain consistent. Although some of the conditions of the study were taken for granted, such as the implementation of the reading programme by the appointed teachers and the initial comprehension levels of the students, incorporating iPads as the cause may be identified as an 'inus condition' identified by Mackie (1974) as: "an insufficient but non redundant part of an unnecessary but sufficient condition" (p.62)

Using Mackie's (1974) 'inus condition', iPads as a cause can be seen as insufficient, as when the tablet is not used as an e-reader and/or incorporated into a specified streamed reading programme, there is a lack of evidence to suggest the tablet would or could increase reading comprehension. iPads can also be viewed as non-redundant as there is a possibility that they aid in the understanding of reading text that is antithetic to the other factors in the constellation (as such, the teacher, duration of reading programme and so forth). It is part of the sufficient conditioning within the research, to increase reading comprehension and perceived learning and engagement with iPads in combination with the full constellation of factors. However, this condition also falls under the category 'not necessary' because there are other sets of conditions that can also increase students reading comprehension.

A belief held by Shadish, Cook & Campbell (2002) is that most causes in experimental research can be more accurately called 'inus' conditions, due to the fact that many factors are normally required in order for an effect to occur, yet we can rarely identify all of them and how they relate to each other.

3.6 Research method

3.6.1 Testing

Tests can be used for evaluation purposes and are commonly used in quantitative research as "a powerful method of data collection" (Cohen et al, 2011, p. 476). Standardized tests are normally developed by psychometricians and according to Hidden Curriculum (2014) consist of a common bank of questions in which all participants are exposed to and is subsequently scored in a consistent manner, enabling the comparison of relative performance of individual or group participants. Non parametric tests are designed for a specific population and are valuable to teachers because of their ability to provide information from designated subjects (Cohen et al., 2011). Likewise, one of the main advantages for using norm-references tests (NRT) is to classify students, as well as highlight academic achievement between and among each other (Cox & Vargas, 1966).

3.6.2 Configuration of tests

The pre-tests were conducted over a one-week time period prior to the implementation of the reading unit implemented within the research framework. The student participants were administered the test individually under the guidance of the researcher, in a comfortable, familiar semi isolated classroom environment in order to promote 'empowerment' to the participants by way of conducting the research on their 'home ground'. Each test was approximately 45 minutes in duration which included the time it took the participants to read out

loud the prescribed passages, as well as answers the subsequent questions verbally. Participants were frequently asked at the end of reading a passage if they would like to continue with the remainder of the test or if they would like to finish on their own terms. Identical testing conditions, environmental setting, procedure and time allocation was set up for the subsequent post-test at the conclusion of the 5-week study.

3.6.3 Instrument and Profile of Participants

The reading performance test administered to the participants individually, by the researcher, measured three traits of reading achievement; comprehension, accuracy and rate (words read per minute). The administered tests to both groups of participants were identical for each group and administered in the same environment and under consistent conditions. Both the pre and post-test were parallel in structure, consisting of six short reading passages. Subsequent to the participants reading a passage, four to five comprehension questions relating to the passage were asked. Reading passages and comprehension questions for the pre and post-test were of a similar skill but differed to eliminate familiarisation. The data obtained from the tests was used to answer the question;

'Do iPads when used as an e-reader and application, in a middle school reading programme, influence student's reading achievement?'

The two tests were administered to a total of 45 participants. The treatment group consisted of 19 participants (due to their access to an iPad while at school), while 26 were placed in the control group. The 45 participants from both groups combined made up for approximately 28% of the total student population within the middle school year group tested.

The pre-test was administered at the start of the investigation to all 45 participants, followed by the same 45 participants completing the post-test 5-weeks later

3.6.4 Conceptualisation of the Test

It is important that researchers who use published tests, are aware of the tests purpose, objectives and content aligning with that of their own during the evaluation, in essence, ”the test demonstrates fitness for purpose”. (Cohen et al, 2011, p.479).

The Neale Analysis of Reading Ability, 3rd Edition (Australian Standardisation) published by the Australian Council for Educational Research was used as the primary method of quantitative data collection within the quasi experimental pre-test-post-test non-equivalent group design.

The Neale Analysis of Reading Ability is an individually administered test of oral reading ability. The standardized test was chosen as it allowed the researcher to perform the small scale assessment in which the researcher assessed individual participants reading ability level in an informal one-on-on situation within the participants' familiar and comfortable surroundings of the classroom. The tests were also utilized due to its inapplicability in New Zealand classrooms and therefore minimal chances of the participants' prior exposure to the test before the commencing of the study. The testing procedure involved establishing the participants reading level followed by the participant progressively reading passages aloud and orally answering comprehension questions until a specified number of errors have been made. Each passage was set at a level which increased difficulty in vocabulary and grammar as the participant progressed. The researcher recorded the time taken in seconds and the errors made during reading on the student's individual record.

Upon completion of the test administration an error count of the number and types of errors was made (mispronunciations, substitutions, refusals, additions, omissions, and reversals) and recorded. The measures provide three raw scores: Accuracy, Comprehension, and Rate. The standardized forms of the reading

passages were presented in two parallel sets, allowing the researcher to assign one set as a pre-test and the other a post test.

Tests are frequently used in inter method mixing (Johnson & Turner, 2003). The inter method mixing of the standardised tests and a questionnaire was used within the study to provide information about what might affect reading achievement, Subsequent to the tests, participants completed a quantitative questionnaire in order to gauge their engagement and learning. The combination of the questionnaire and tests was fundamental to the research question of determining the relationship of engagement and beliefs to reading performance.

3.6.5 Limitation of Tests

"Users of test scores often assume achievement scores are direct and ambiguous measures of student achievement..." (Koretz, 2000, p.4) and previously, "the standardized achievement test score has been the operational definition for educational achievement and as such, raising test scores has been equated with educational improvement" (Haladyna, Nolen & Haas, 1991, p.2). However, scores in most achievement tests are limited to the measure of latent constructs of interest with certain aspects of student proficiency, (Koretz, 2000). Measures of such constructs tests can be seen as incomplete as they supersede to a fallible nature based on measurement error, their vulnerability to corruption or inflation (Koretz, Bertenthal & Green, 1999) and possible test score 'pollution'. (Haladyna et al., 1991).

Yet, for the purpose of this research, it is noted that the test was used to the extent of allowing the researcher to justify their hypothesis in generalizing from the test scores to the latent construct of reading achievement.

3.7 Survey Questionnaire

The survey method is encapsulated within the theoretical framework of postpositive consequent of the science research perspective of "the prediction and explanation of the behaviour of phenomena and the pursuit of objectivity" (May, 2001, p. 10).

Surveys and questionnaires are among the most frequently utilized research methods. Surveys, particular self-administered, are ideally suited for educational researchers as they evaluate what people commentate they believe in the form of feelings and opinions (Nardi, 2015) which is not always able to be measured or observed with other research methods.

The descriptive approach of using surveys was for the researcher to gain a wider understanding of the relationship between iPads and the participants perceived learning and engagement in reading. A self-administered survey was chosen due to a number of key features such as being cost effective, ability to target the chosen population at once time and place, generate numerical data and gather standardised information, as well as the ability for closed question responses to be amendable to statistical treatment and analysis (Cohen et al., 2011; Morrison, 1993).

3.7.1 Conceptualization of the survey

Emotion consists of multiple facets, including physiological, behavioural and experimental dimensions (Izard, 1977). However, assessing the experimental component of emotion can often be a challenge (Lishner, Cooter & Zald, 2008). The construction of Likert (or Likert type) scale is rooted into the aim of the research (Joshi, Kale, Chandel & Pal, 2015, p. 397) and "...use descriptive terms relating to the factor in question" (Stanley & Hopkins, 1972, p. 290). Likert scale questions were chosen, in order to explore more in-depth, the student's feelings, emotions and opinions towards their learning and focus in reading, when utilizing iPads applications or written bookwork. The survey questions required the respondents to reflect on the recent reading unit they had completed and

their levels of enjoyment, their enhanced learning, confidence, skill development and focus. The researcher acknowledges the success of the survey was affixed to the overall aim of the study being highlighted before the survey was designed and the questions constructed.

The researcher understood the importance of piloting the survey prior to administration to ensure validity and reliability (Brundrett & Rhodes, 2013) and was needed in order to eliminate possible ambiguous questions and to clarify readability for intended respondents for which the survey was then amended accordingly.

Likert scale closed questions were used to gauge the level of sensitivity and intensity of responses while also understanding that due to the nature of the respondents being young adolescent children there was a need to accommodate their experience and levels of knowledge within the survey effectively and efficiently. As Lambert (2008) suggests, that especially in that of educational research, survey questions need to be clear, concise and well-presented alongside rating scale categorizations which should be well-defined, mutually exclusive, univocal and exhaustive (Guilford, 1965). The Likert scale reflected the feelings of the students in response to the questions posed. The 5-point scale responses were *strongly disagree (1), somewhat disagree (2), not sure (3), somewhat agree (4), strongly agree (5).* 'If the position of neutrality (neutral/don't know) lies exactly in between two extremes of strongly disagree (SD) to strongly agree (SA), it provides independence to a participant to choose any response in a balanced and symmetric way in either directions' (Joshi et al., 2015, p. 397). Emotive cartoon face illustrations accompanied each Likert scale response to support the response choice and eliminate possible confusion from the respondents during selection. In order to maintain un-dimensionality, the scale only measured one response to each question at a time (Oppenheim, 1992).

The surveys were administered to both the treatment group and control group participants simultaneously. Appropriate behaviour and respect were established

prior to the survey being handed out and instructions clearly given. The researcher's presence also allowed some control over the type of environment the survey was administered in e.g. the time of day, noise distractions, ensuring the surveys are allocated to the right participants etc. All participants completed the survey within the twenty-minute time frame, and due to the researcher being present, all questions were answered voluntarily.

3.7.2 Limitations of Surveys

Closed question surveys may be uniform however, the fixed responses also limit the amount a researcher can adjust the questions, particularly to accommodate cultural differences in respondents (Nardi, 2014). An important issue that arises with such questions is the extent to which they validly gather data from individuals whose perspectives, interpretations and understandings may differ from the researcher (Boniface & Burchell, 2000).

Another limitation resides within the participants' ability to understand and comprehend the survey format and wording. Respondents' differing conceptual and linguistic abilities, can present potential barriers to the comparability of survey data and as such possible participants who have limited formal education and/or little familiarity with the survey process are likely to be unsure of the overall intent of survey questions and the intended meaning of specific words (Miller, 2003, p.264). Consequently, accurate representations of subpopulations from the respondents may be compromised through invalid data.

While the presence of the researcher when administering the survey may be beneficial in terms of enabling any queries participants have and ensuring the survey is completed fully by the respondents, the researcher must be aware of the possible influence the researcher has on the participant's response quality (Webster, 1997). Respondents may feel uncomfortable due to a sense of compulsion to complete or undertake the survey in the first place; despite being unwilling (Cohen et al., 2011) or have the opposite affect known as 'social

desirability bias'. Social desirability bias is identified as an incident where survey participants provide answers that are socially desirable as to create a more favourable or positive impression in their survey participation (Roxas & Lindsay, 2011). According to King and Bruner (2000) and Leggett, Kleckner, Boyle, Duffield and Mitchell, (2003) such bias is prevalent in situations where the respondents answer the survey questions in the presence of the researcher.

A limitation when using Likert scales is the inability for respondents to express any further comments about the issue under investigation and the information received tends to offer description rather than any deep explanation and insight around the respondents chosen emotion (Munn & Drever, 1996). Another limitation is the researcher's incapability to assess whether respondents are truthful in their responses, or deliberately falsifying their answers.

While in contrast to other rating scales, Likert scales can be considered to provide stronger conclusions about the differences among the intermediary ratings of various respondents, due to the verbal descriptors of intensity accompanying each discrete numerical point (Lishner, Cooter & Zald, 2008), this can be a limitation as respondents can assume illegitimate inferences whilst no equal intervals actually exist in that, strongly disagree is not twice as powerful as somewhat disagree and so forth (Oppenheim, 1992).

3.8 Interviews

Qualitative research can be defined as "a form of social inquiry that focuses on the way people interpret and make sense of their experiences and the world in which they live." While the foundation of the research "lies in the interpretive approach to social reality" (Holloway, 1997, p.2) and to "investigate the meaning of social phenomena as experienced by the people themselves." (Malterud, 2001, p. 398).

A phenomelogical approach to interviewing focuses on the experiences of participants and the meaning and interpretation they make of that experience (Seidman, 2013) while analysing consciousness (Kvale, 2007) through subjective

understanding i.e. the researcher strives to make sense and understand the participants experience from their point of view (Schutz, 1967, p.20). Interviews are helpful since knowledge is often generated between humans through microcosms of consciousness and thus provide access to the most complex social and educational issues often not possible to establish through the use of other techniques (Burton et al, 2014; Patton, 2005; Seidman, 2013; Vygotsky, 1987).

According to Miller and Crabtree (2004) "Meaning is constructed through an interexchange/co creation [sic] of verbal viewpoints …" p. 185 and is not simply an ordinary, everyday conversation (Dyer, 1995) but an "a construction site of knowledge" (Kvale, 2007, p. 21). It is important to acknowledge that the participants are "…viewed as meaning makers, not passive conduits for retrieving information…" (Warren, 2002, p. 83) and therefore the researcher needs to be vigilant and mindful when handling the interview in a sensitive and professional manner, where the conversation has a clear power asymmetry between the researcher and subjects (Dyer, 1995; Kvale, 1996, Kvale, 2007), in order to create an appropriate atmosphere in which "the participant can feel secure to talk freely"... due to the researchers thoughtful consideration of the "interpersonal, interactional, communicative and emotional aspects of the interview (Cohen et al, 2011, p.422). Yet, despite intense focus highlighting the importance of 'setting the scene' and question design, Seidman (2013) insists that "Listening is the most important and hardest skill in interviewing...requiring concentration and focus beyond what we are used to in everyday life." (chapter 6, para. 2)

3.8.1 Conceptualisation of an interview

In the construction of the interview, semi-structured, face-to-face, focus group interviews were chosen as the question format allowed for the supply of knowledge required while being 'open' to allowing changes of sequence to follow up on the specific stories and answers given by the subjects (Lincoln and Guba, 1985; Kvale, 2007). The chosen classroom environment and synchronous communication assisted in the creation of a good interview ambience i.e. the

interviewer was able to make more use of a standardisation of the situation while maintaining context through a natural setting (Lincoln & Guba, 1985; Opdenakker, 2006). Group interviews assisted in the exploratory study by accommodating furtherance in subject interaction in order to facilitate expression viewpoints of differentiation rather than consensus (Kvale, 2008). According to Greig, Taylor and McKay (1999) group interviews can also be less daunting and intimidating for children compared with that of individual interviews.

The semi-structured format as an interview decorum allowed the researcher to guide the interview ensuring the key issues were addressed, yet still allowing some degree of latitude in what is discussed (Burton et al., 2014) Subsequently, semi-structured format provides an initial context when engaging with the participants (Holstein & Gubrium, 1995). Open-ended questions which focus on the topic of research encourage more expansive responses from participants (Burton et al., 2014) and allows a process of questioning that links prompt, probes and checks (Denscombe, 2003) without the presumption of an answer (Seidman, 2013). Likewise, it is vital to understand the primacy of these questions and ensure that the orienting questions are precise, thereby sanctioning the researcher to guide the respondent towards certain themes, without imposing specific viewpoints (Kvale, 2007).

The semi-structured interview protocol identifies topics for conversation rather than a specific list of questions (Magnusson & Marecek, 2015) while providing opportunity for questions to be asked that invite the interviewee to relax and engage in conversation before the core sub questions relating to the study are presented (Creswell, 2012). The protocol both assists in the systematic and focused collection of data (Lodico et al., 2010) and is encapsulated by the essential process of recording or "logging data" (Loftland & Loftland, 1995, p.66) composed of initial jottings, daily logs or summaries and descriptive summaries (Emerson, Fretz & Shaw, 1995; Sanjek, 1990). A key ameliorate of semi-structured interviews is the attention to lived experience through participants'

thoughts, beliefs and values while simultaneously addressing theoretically driven variables of interest (Galletta, 2013). Semi-structured interviews as part of a multiple method research contribute to the depth and breadth of the study in terms of analysis, interpretation of findings and in the theorizing about the possible implications of the study for the future (Galetta, 2013).

3.8.2 Limitations of interviews

The weaknesses of group interviews are linked to the process of producing focused interactions, raising issues about both the role of the interviewer in generating the research data and the impact of the group itself on the data (Morgan, 1996). Interviews can be time-consuming, from the conceptualization of the interview guide and the organization and running of groups to the analysing of transcripts (Denscombe, 2014; King, 1994; McLafferty, 2004). Consequently, the constraints of personnel, finance and time exigent a small-scale study; although as such the qualitative design is still applicable for a small number of participants (Drew et al., 2008).

Interviews as a research method are not possible without partnership, yet the research interview is a specific professional conversation with an obvious power asymmetry between the researcher and the subject (Kvale, 2008). However, researchers must strive to eliminate positivist conceptualizations of interviewing which are characterized by the asymmetric of power (Mishler, 1986). Researchers can strive to decrease their position of power by ensuring that face-to-face interviews are relaxed encounters through the use of accessible and informed language to put their participants at ease (Magnusson& Marecek, 2015), as well as shaking off their self-consciousness, suppress their personal opinion and avoid stereotyping at all costs (Holstein & Gubrium, 1995).

'Interviews focus on what people say, rather than what they do' (Descombe, 2014, p. 202). Researchers are not 'mind readers' and as such cannot absolutely verify the credibility of the participants' responses or eliminate the possibility

that the answers the respondents provide are not superficial, nor untrustworthy through deliberate deception or unwitting bias (Denscombe, 2014; Munn & Drever, 1990; Kvale, 1992). While there is a seemingly innocent assumption, participant respond truthfully and accurately during interviews (Fontana & Frey, 2008), precision can be enhanced through careful interview techniques and in documenting the participants' perceptions, justified in the set criteria the judgements are made from (Bloomberg & Volpe, 2008; Kvale, 1992).

3.9 Researching children

Research on child interviewing has prospered over the past 25 years as expectations about children's agency, competence and participation in society has changed (Saywitz & Camparo, 2013, p. 371). Children have been regarded as 'the best sources of information about themselves' (Docherty & Sandelowski, 1999, p. 177) and interviewing allows them to share their own experiences, memories, preferences, perceptions and understanding of their world, which ultimately can affect many. (Camparo, 2013; Kvale, 2008; Saywitz). It is important that the interviewer endeavours to understand the world of a child 'through their own eyes' rather than through the lens of an adult (Docherty & Sandelowski, 1999, p. 177).

According to Arksey and Knight: children differ from adults in their cognitive and linguistically development as well as their ability to recall, life experiences, attention and concentration, status power which all have pertinence on the interview (1999, p.116-118). Consequently, a power and status dynamic is heavily implicated when interviewing children as they have little in comparison with the interviewer as an adult (Eder & Fingerson, 2003). Sharma and Thomas (2009) comment that power dynamics can influence the possibility of 'prestige bias' to occur, p.179. An example of this is when children may endeavour to 'look good' of appear 'informed' by offering what they perceive to be 'the right answer' (Brundett & Rhodes, 2013) or what they think the interviewer wants to hear, thus providing unreliable or directly false information (Kvale, 2008, p.522).

Open- ended questions are usually not only more accurate (Wright & Powell, 2006) but are more respondent driven and focused thus are more compatible for children with limited linguistic or cognitive abilities (Cohen et al., 2011). Power relations between interviewer and children can be minimized when children are part of a group setting (e.g., Lewis, 1992) and the interview is established in a setting which is as close as possible to a natural setting for the children (Greig and Taylor, 1999).

3.9.1 Contextual Factors

Children are active in the construction and determination of their social lives (Irwin & Johnson, 2005, p.821). As such, they are not simply the recipients of contextual influences, but rather are industrious in the constructuion of their worlds (Coles, 1986; James, Jenks & Prout, 1998; Mayall, 1996). According to Saywitz and Camparo (2014) contextual factors, such as the physical setting and the psycho-social atmosphere, play a pivotal and influential role in the interview outcome, p. 381. A great deal of inconsistency across interviews is due to children's' ability to perform interview required skills better in some contexts than others (Price and Goodman, 1990; Revelle, Wellman and Karabenick, 1985).

Previous studies have indicated the power and importance contextual factors have to children's' responses. Research conducted by Bruck, Ceci and Hembrook (1998) as well as Malloy et al., (2005) demonstrated the power interviewers had to distort children's reports by manipulating interviews through the interviewers' priori knowledge and the introducing the child respondents to misleading information through suggestive questioning. Likewise, a further study conducted by Bottoms, Quas and Davis (2007) found the benefits of social support provided by the interviewer in the form of eye contact, warmth and so forth, alongside a supportive, relaxed approach when questioning helped to assist the children to overcome resistance and led to improved responses without contaminating their accounts.

3.10 Validity and reliability

3.10.1 Validity and reliability in experiments

Validity is inextricably bound up with taking an ethical, rigorous and reflective approach to research (Patton, 2002; Smith, 2006; Silverman, 2005). While in much quantitative research, validity must be faithful to its premises of positivism and post positivist principles, it must also ensure that types of validity are adequately discussed; involving being faithful to the assumptions which underpin the statistics used, the construct and content validity, the measures used and the avoidance of a range of threats to internal and external validity (Cohen et al., 2011, p.326). Such threats have a valuable function, as they "help researchers to anticipate the likely criticisms of inferences from experiments… so that the researcher can try to rule them out" (Shadish et al., 2002, p.40) This researcher wishes to identify and address the three related components of statistical conclusion validity, internal validity and external validity as outlined by Cook and Campbell's (1979) validity typology.

3.10.2 Statistical Conclusion Validity

Statistical conclusion validity can be described as the extent in which conclusions formed from the relationship among variables (based on the data from the experiment) are correct or reasonable. It concerns two related statistical inferences that affect the covariation component of casual inference, as in whether the presumed cause and effect convey, and how strongly they convey (Shadish et al., 2002). Further explanation into the covariation of the presumed cause and effect can be divided by two specific 'type' errors. Type I error occurs when the null hypothesis -iPads do not affect the reading achievement in middle school students, is true, but is rejected by the researcher and a Type II error occurs when the alternative hypothesis- iPads affect the reading achievement of

middle school students, is correct, but the researcher fails to reject the null hypothesis, therefore, there is an effect but the researcher fails to detect it.

For the outlined experiment, the researcher has identified two main threats to the data statistical conclusion validity; low statistical power and unreliability of treatment implementation. Furthermore, the researcher proceeds to outline the specific measures which will be undertaken during the analysing of the data in an attempt to increase the validity.

3.10.3 Low Statistical Power

Low statistical power by definition means "…the chance of discovering effects that are genuinely true, is low (Shadish et al., 2002, p.46). Power is referred to as the ability of a test to detect relationships that exist in the population and it is conventionally defined as the probability that a statistical test will reject the null hypothesis when it is false (Cohen, 1988; Lipsey, 1990, Maxwell & Delaney, 1990). Consequently, according to Shadish et al., (2002) Button, Ioannidis, Mokrysz, Nosek, Flint, Robinson and Munato, (2013) low power occurs frequently in experiments and those which exhibit it have a reduced chance of detecting a statistically significant result which reflects a true effect.

The researcher acknowledges that if her experiment has insufficient power then it is in danger of incorrectly concluding the relationship between iPads (treatment) and reading achievement (outcome) as not significant. The constricting demands underpinning the experiment such as time, funding and the participants, put limitations to the methods applied to the experiment in order to increase power. As such methods such as increasing the number of control and treatment participants and the cost/power trade off of adding covariates and increasing sample size (Allison, 1995; Allison et al., 1997) and allocating more resources to post-test than to pre-test measurement (Maxwell & Delaney, 1994) is not plausible. Rather, the researcher has chosen to apply the method of measuring the covariates correlated with the outcome and adjust for

them in statistical analysis (Maxwell, 1993). The adjustment is to be made in the form of a t-test for independent samples which will be used to test and possibly reject the null hypothesis. This can also be described as null hypothesis significance testing (NHST).

3.10.4 Unreliability of Treatment Implementation

If a treatment is intended to be implemented in a standardized manner but is implemented inconsistently from site to site and person to person for some participants, then the effects may be underestimated compared to that of full implementation (Boruch & Gomez, 1977; Cook, Habib, Philips, Settersten, Shagle & Degirmencioglu, 1999; Shadish et al., 2002). Shadish et al., (2002) further add that "experiments benefit from making sure treatment is implemented as intended and from having very specific information about the extent to which the intervention is actually delivered and then received and implemented by the recipient" p.315. Treatment implementation is a multifaceted process that includes treatment delivery, treatment recipient and treatment adherence (Lichstein, Riedel & Grieve, 1994).

The delivery of the treatment was planned in detail with the teachers in charge of the two reading classes involved in the experiment (one in charge of the treatment group/class, the other in charge of the control). Both teachers collaborated together alongside the researcher in designing detailed unit plans one of which outlined the implementation of the treatment in each reading lesson for the duration of the experiment (5-weeks). Both unit plans were identical apart from the variation in treatment (iPads) compared with traditional texts and record of work (pen and paper) for the control. Furthermore, before the initiation of the experiment, another meeting was set up between the researcher and the two teachers involved, whereby the teachers involved verbally affirmed they were comfortable in their ability to complete the experiment with ease according to the unit plan and individual lesson outlines. This ensured that the intervention was delivered according to the researchers

wishes and minimised variation in treatment delivery. According to Shadish et al., (2002) treatment may be delivered with less integrity if they are burdensome, of long duration, inconvenient, are expensive or when they require the recipient to alter his or her lifestyle. Due to the treatment aligning with the participants normal reading classes which were concrete in their day, time and frequency throughout the school week, as well as the duration of the experiment being parallel with other reading unit time frames (5-weeks), there was minimal inconvenience to the participants or change to their lifestyle, thus increasing the service delivery of the treatment.

Often failure of treatment receipt can be due to failure of communication between the deliverer and the recipient. This can be caused by such factors as poor communication on the providers' behalf, to the recipients, or if the recipient has low motivation or is inattentive. For this experiment, the deliverer was an expert teacher who had sound knowledge and understanding of how to implement the treatment (iPads) and as such communicated the treatment clearly and in a way that appealed to the recipients. Treatment receipt was measured throughout the treatment process through communicating with the recipients thus monitoring their confidence, interest, engagement and motivation throughout the experiment. Treatment receipt may also be measured using the participant's perceived level of engagement and learning post treatment, by analysing their survey and interview responses.

3.10.5 Internal Validity

Internal validity can be described as the extent that inferences of causality can be created regarding the obtained relationships between the independent variable and the dependant variable (Crano, Brewer & Lac, 2014).

Threats to internal validity can be described as possible causes other than those identifies by the researcher (inus condition) that could have occurred even in the absence of the treatment. However, with quasi-experiments the situation is

more caliginous due to the differences between the treatment and control groups being more systematic than random, therefore the investigator needs to rely on other discretional measures to reduce the internal validity threats (Shadish, et al., 2002). For all intents and purposes, this researcher acknowledges that where applicable, the study's design features were modified to reduce internal validity threats and subsequently, this alongside other threats, will be explicitly identified and ruled out as followed.

3.10.6 Regression Artefact

As outlined earlier, the participants were selected for the research based on two key factors: their access to an iPad while at school and their reading ability which ascertained to the streamed reading group/class they were in. The students who were selected to participate were not selected based on their high (or low) reading ability, thus the internal threat of 'regression artefact' can be eliminated. While some may label the participant selection as bias, due to possibility that the control group were as disadvantaged due to their lack of expose to iPads, the researcher considers the threat to be minimal as the treatment group had only been exposed to their iPads in an educational setting (excluding previous reading lessons) for a minimal time period (three months) before under-going the study and were only exposed to the treatment in their reading group for the duration of the study.

3.10.7 History and Maturation

Internal validity such as history and maturation were also identified and reduced as a result of the study's design. History can be referred to as "All events that occur between the beginning of a treatment and the post test, which could have produced the observed outcome in the absence of that treatment." (Shadish et al., 2002, p. 56). The plausibility of history was reduced by ensuring both the control and treatment groups selected were from the same location such as the

school, year group, reading ability and age (therefore, eliminating the threat of maturation also) as well as ensuring the schedule for the testing for both groups was completed within a three day time frame.

3.10.8 Validity and reliability in tests

According to Cronbach (1971; 2013), 'One validates not a test, but an interpretation of data arising from the specific procedure' p. 447. In other words, 'The task of validation is not to uphold a test practice or theory' p. 3. Researchers when using testing as a way of acquiring data must ensure the test is appropriate, reliable and valid (Borsboom et al., 2004; Carmines and Zeller, 1979; Linn, 1993). An 'operationist' perspective reiterates that when test content is attached to a domain of performance, validity is intricately bound to the content outline, the injunction to the subject and the instructions to the tester as any change may alter what is measured (Cronbach, 2013; Gipps, 1994). In addition to these factors, many researchers acknowledge the affect the participants and tester has on reliability in the form of participant motivation (Airasian, 2001; Wiggins, 1998), the relationship between participant and tester, as well as conditions such as time and place (Stiggins, 2001).

The researcher also acknowledges reactivity as a threat to validity, in the form of familiarity when presenting participants with a similar pre and post-test. Participants may exhibit results that could be mistaken for treatment effects. Results from experimental research suggest that testing effects are sufficiently prevalent to be that of concern (Putnam and Wilson, 1982) although Menard (1991) notes that this is less common in designs in which the interval between tests is quite large. As the participants were tested using a standardized test that they had not previously been exposed to, and in which the time frame between the pre and post-test was a period of five weeks, the threat of reactivity producing results which could be erroneous with the possible treatment effects would be considered nominal.

3.10.9 Validity and reliability in Rating Scales

Validity of Likert scales is "driven by applicability of the topic concerned in context of respondents understanding and judged by the creator of the response item" (Joshi et al, 2015, p. 397). As such '...determination of the optimal number of rating categories becomes an important consideration in the construction of such scales' (Matell and Jacoby, 1971, p.651). According to Garner (1960), the basic question is whether for any given rating instrument, there is an optimal number of rating categories' p.657. Such question has been the catalyst for debate and investigation amongst researchers as to the best possible usability in terms of reliability and validity of number of points on the scale (e.g., Nunnally, 1967; Guilford, 1954; Stone and Wright, 1994). Unfortunately, often the research generated contradictory conclusions and left the question 'unresolved'. Researchers have suggested that validity increase with increasing numbers of response categories or scale points (Chang, 1994; Hancock and Klockars, 1991) and consequently statistical scales with small numbers of response categories such as, 1-4, yield scored that are less valid and less discriminating than those with 5 or more categories (Loken et al., 1987, Preston and Colman, 2000).

Yet, it is important to address that different scales maybe suited to different purposes and motivating participants in order to avoid ambiguous items may minimize possible effects of scale format on participant responses and scale properties. (Krosnick and Alwin, 1987; Preston and Colman, 2000; Weng and Cheng, 2000).

3.10.10 Validity and reliability in Interviews

The underlying question interviewers need to address is "Is the account valid, and by whose standards?" (Creswell, 2012 p.243). Terms abound in qualitative literature regarding validity are widely discussed in matters of *trustworthiness, authenticity* and *credibility* (Creswell, 2013; Creswell & Miller, 2000; Lincoln,

Lynham & Guba, 2011). Due to the interpersonal, human interaction of interviewing, it is inevitable the data gatherers and the characteristics they possess will have some influence on the participants and empirical materials (Hitchcock and Hughes, 1989; Pezalla, Pettigrew, Miller-Day, 2012). According to Denscombe (1995) interview neutrality is a 'chimera' however, the most practical way of achieving greater validity it to recognise and affirm the role of the instrument-the interviewer (Seidman, 2012) and "to minimise the amount of bias as much as possible" (Cohen et al., 2011, p.204) through the interviewer understanding that meaning is a by-product of the interaction and for the interviewer to use their skills to minimize the distortion that can occur due to their role in the interview (Lincoln & Guba, 1985; Patton, 1989; Seidman, 2012). It is important the interviewer is aware the sources of bias can reside in themselves, the respondents and/or in the substantive content of the questions (Cohen et al., 2011). Validity to the finding can be achieved through '...the use of *rich, thick description* to convey the findings' (Creswell, 2013) as clarifying potential bias through the researcher providing self-reflection in the form of reflectivity.

Qualitative reliability indicates that a researchers' approach is consistent across various researchers and various projects (Gibbs, 2007). It is believed that reliability in interviews can be controlled through 'a highly structured interview, with the same format and sequencing of words as error and bias stem from alterations to wording, procedures and sequencing' (Oppenheim, 1992; Silverman, 1993). Yet according to Scheurich (1995), researchers should not misread the unlimited complexity and 'open-endness' of social interaction, and controlling the wording in no way is a guarantee for controlling the interview. Gibbs (2007) suggests reliability is proven through such procedures as checking transcripts while Miles and Huberman (1994) recommend researcher constantly comparing their codes for consistency.

3.11 Credibility

Credibility refers to whether the participants' perceptions of the settings or events match up with the researcher's portrayal of them (Lodico et al., 2010, p.169). As researchers seek to understand the 'meaning behind the experience' credibility can be examined with reference to the procedures the researcher engaged in, in order to obtain in-depth accounts from the respondents. An example of this is when researchers take part in meaningful interactions with the participants both prior and during the interview to develop trust, resulting in participants becoming more comfortable and providing more authentic responses (Hammersley & Atkinson, 1983; Lodico et al., 2010). Likewise, the building of trust allows for 'member validation' or 'member checking', whereby researchers can check accuracy and enable the respondents to validate or clarify their statements, as well as allowing the researcher to gather additional information, where applicable and necessary (Cohen et al., 2007; Creswell, 2013; Kvale, 2007; Lodico et al., 2006).

As the researcher shapes the final story that is told it is vital to ensure that the retelling by the researcher captures in essence, the true meaning of the participant's experiences (Lodico et al., 2010). In qualitative research, no interview or interpretations are perfectly repeatable and as such, triangulation serves a distinct purpose to clarify meaning by identifying different ways the phenomenon is being seen (Denzin, 2008; Stake, 1994). This also assists in the comfirmation of data and to ensure it is 'complete' (Begley, 1996; Casey and Murphy 2009). Interviews alongside that of the survey data allowed the researcher to attempt external triangulation by using the data from both methods of evidence from the respondents to '...build a coherent justification from the converging sources of data' (Creswell, 2013) and to ensure they (the researcher) has a deep understanding of the phenomena studied and as such, provide an accurate description and clarify meaning from the standpoint of the

researcher and the participant (Creswell and Miller, 2000; Denzin, 2008; Lodico et al., 2010; Stake, 1994)

3.12 Dependability

Dependability parallels the notion of reliability in quantitative research and "… refers to whether one can track the procedures and processes used to collect and interpret the data" (Lodico et al., 2010, p. 172) in other words, how stable the data is (Graneheim & Lundman, 2004; Shah & Corley, 2006). Dependability of qualitative research can be enhanced through 'audit trail rigour', by highlighting and discerning for the reader, the decisions made throughout the research process in order to provide rational for the methodological and interpretive judgements of the researcher (Houghton et al., 2013). Accordingly, Koch (1994) believes that while readers may not share a researcher's interpretation, they should still be able to discern the means to which it has been reached. This can be achieved through the researcher presenting faithful descriptions which are recognisable to the readers (Horsburgh, 2003; Rubin and Rubin, 1995) in the form of comprehensive notes relating to the contextual background of the data, as well as the rationale and reasoning behind all the methodological decisions (Glaser and Strauss 1967, Ryan- Nicholls and Will 2009).

3.13 Transferability

Transferability refers to the degree of similarity between the research site and other sites as judged by the reader (Lodico et al., 2010, p.173). It is the responsibility of the researcher to provide thick descriptions in the form of accounts of the context, research methods and examples of raw data (Stake, 1995) in order for the reader to make informed decisions and judgements of the findings in relation to their own sepcific contexts (Bogdan and Biklen, 2002; Lincoln and Guba, 1985; Lodico et al., 2010; Stake, 1995). Enhancing transferability in qualitative data can be achieve through a rich and robust presentation of the findings with appropriate quotations, however ultimately, it

is the reader who decide if the findings are transferable to another context (Graneheim & Lundman, 2004).

3.14 Reflexivity

According to Richardson: "No writing has 'privilege status' or is superior over other writings" (1994, p.518). Therefore, qualitative research requires reflexivity as researchers are inescapably part of the social world in which they are researching (Hammersley & Atkinson, 1983). Reflexivity is the acknowledgement and disclosure by researchers of their own selves, by way of how their values, bias, culture, experiences and personal background create a 'lens' to which they see, understand and interpret the already interpreted world of their participants (Cohen et al., 2011; Creswell, 2013; Pressley Graham & Harris, 2006). Reflexivity enable readers to symbolically engage the researcher and enter through the research window of clarity (Altheide & Johnson, 2011, p.591) which may "highlight specific aspects of the phenomenon being investigated and bring new dimensions forward, contributing to a multi-perspectival construction of knowledge" (Kvale, 2007, p. 86). Likewise, Agger (1991) suggests that challenging text cannot be understood without references to ideas being concealed by the researcher and contexts within the researcher's life.

Interviews are an 'inter-view' as in an exchange of views between the interviewer and the respondents on a topic of mutual interest (Kvale, 1996, p.11) as part of a social interaction. The interactional encounters, and social dynamics encompassed within these interactions shape the knowledge that is generated, resulting in the effect that interviews are particularly vulnerable to the influence of variables in the form of interviewer-respondent relationship, gender and gender roles, race, social status and age (Fontana & Frey, 2008). Research was conducted at the school in which the participants attended in assist in minimizing reactivity affects, which can occur when 'respondents behave differently due to being placed in a new situation' (Lave & Kvale, 1995 p.226). Although the researcher previously taught at this school, she had not taught there 4 years prior to the study, and as such, able to avoid the 'halo effect', where the

influence “of knowledge of other data about the person or situation exerts an influence on subsequent judgements…” (Cohen et al., 2007, p. 145).

3.15 Ethical considerations

Due to their position of ‘power’, it is imperative researchers comprehend the ethical implications or their research (Mutch, 2013). According to Griffiths (1998) “Educational research is …complex for three main reasons: human agency; social relations, especially the effects of power; and ethics” (p. 36). This research project was presented (and approved) to the Faculty of Education Research Ethics Committee in accordance with the University of Waikato’s Ethical Conduct in Human Research and Related Activities Regulations 2008. Ethical consideration is particularly important in mixed methods research as “it plays a role throughout the entire research process” (Hesse-Biber, 2010, p.55) pertaining that researchers must remain vigilant in checking their ‘power’ stance and the ramifications of their position at every stage of the investigation.

3.15.1 Informed consent

Informed consent is the cornerstone of ethical behaviour, as it respects the rights of individuals to exert control and make decisions for themselves (Howe & Moses, 1999) Initial meetings were held between the researcher and the multiple ‘gatekeepers’ who facilitated access to the institution and thus eventually the research participants. Following the meeting, informed consent was sort by the institute, individuals and participants involved in the investigation. All were fully informed about the purpose, conduct, planned procedure and dissemination of the research via a detailed letter of information, including clearly stating the participant’s right to withdrawal from the study at any point in time. Seeking written informed consent from minors was completed in two stages; one by consulting and seeking written permission from the adults responsible for the participants, as well as obtaining written consent from the participants themselves. The information letter sent to the participants was sensitive to their ability to comprehend the nature and process of the research

whilst still providing the participants legitimate opportunity to decline. The notion of 'voluntarism' was frequently highlighted to all parties involved, ensuring all were knowledgeable regarding their freedom of choice to take part (or not) in the study (Cohen et al., 2011). Written consent was obtained from all parties involved in the research. Participants had the right to withdraw from the research at any stage, without prejudice, until the copy of the transcript was confirmed. Due to the age of the participants and the relationship the researcher had with them throughout the research process, even when informed consent had been given by both the participants and their parent/guardian, the researcher complied with the participants' assent. Effort was made by the researcher to maintain trust to remove the reliance on the participants demonstrating adult- centric attributes, accepting the participant's child-like state of being. (Cocks, 2006).

3.15.2 Confidentiality and anonymity

"The notion of confidentiality is underpinned by the principle of respect for autonomy whereby identifiable information about individuals collected during research will not be disclosed without permission" (BSA, 2004). It is understood that "...the concept of confidentiality is closely connected with anonymity in that anonymity is one way in which confidentiality is operationalized" (Heath, Charles, Crow & Wiles, 2007, p.417).

In order to provide anonymity, as much as feasibly possible, the participants' privacy was protected through the individual assigning of pseudonyms during the analysis of qualitative data, and codes for the quantitative data. All quotes are anonymous. Every effort was made to provide confidentiality by using broad descriptions of both the institution and the participants. Information leading to the identity of the participating institution and participants was not included in this report.

3.15.3 Reciprocity and respect

Ethical educational research demonstrates relationships of respect and reciprocity between the researcher and the researched. Many educational researchers believe in the importance to offer potential respondents something in return for participating in a research project (Brooks, te Riele & Maguire, 2014). According to Griffiths (2003) Reciprocity can "…recognize inequalities at the same time as using them for the mutual advantage of all partners." (p. 104) and, ideally, reciprocity means the involvement of active consultation with the goal of establishing a working relationship that can be beneficial to all parties involved (Maiter, Smiich, Jacobson & Wise, 2008, p.308). Reciprocity can be in the form of providing information to the respondents- an ideal underpinned by the feminist perspective. As part of the investigation, participants and relative 'gatekeepers' were aware of the relevance of the study to the participants current learning situation and as such, were open to the opportunity to be provided with information in the form of statistical evidence through the final publishing of the research. Providing feedback or results to participants is another way of showing respect (Liamputtong & Ezzy, 2005). Both gatekeepers and participants were offered the opportunity to receive notification to view an electronic copy of the finished thesis.

3.16 Data Analysis

3.16.1 Hypothetico-deductive statistical analysis

Within the scientific-explanatory paradigm, finding are typically presented from standards and procedures which are used to demonstrate 'empirical warrant', showing the match or fit between its statements and what has or is happening (Cuff & Payne, 1979, p.4) In reference to the quantitative experimental aspect of this mixed methods research project, data analysis consisted of statistical inquiry in order to investigate and identify the null hypothesis of no difference being correct (Argyrous, 2011), that is, there is no relationship between students iPad use and the influencing of their reading achievement. Substantial statistical

analysis concatenates on the awareness of statistical significance. Respectively, a "statistically significant result is one for which chance is an unlikely explanation" (Kirk, 1999, p.337). The t-test was used to discover whether there were statically significant differences between the control and treatment group participants, as well as the pre and post-tests between each group. The t-test for independent samples allowed the researcher to test the same variable (reading achievement) at different times (pre-test followed by the post-test 5 weeks later), while the t-test for paired samples investigated the statistical significance of the results from both the groups against each other.

3.16.2 Procedure for calculating reading achievement

While the researcher acknowledges that reading achievement is a foundation of broad and diverse skills, for the purpose of this investigation reading achievement was defined and isolated to the three distinct reading proficiencies of comprehension, accuracy and rate.

Comprehension was measured by asking set questions relating to the passage just read by the participant. Exact wording of the questions was asked based on the given script. Both correct and incorrect answers given by the participants were recorded in a scoring box below each of the six reading passages. An overall comprehension score was recorded at the conclusion of the test and an average was calculated based on the number of passages read by the participant.

Accuracy was measured by firstly categorising common reading errors such as mispronunciation, substituting words, adding/omitting words, reversals and refusals, followed by observing and accurately recording through a tally, each error at the time of the reading, taking care not to categorise two errors simultaneously. The researcher, through audio recording the participants while they read, was able to thoroughly examine the errors both during and after the participants had been tested. At the conclusion of the test, the errors for each

passage read by the participants were tallied and an overall accuracy average was calculated.

Reading rate was calculated by recording (in seconds) the time it took for the participant to read each passage. The stopwatch was started as the first word from the passage was spoken and stopped when the last word was read. The seconds from each passage read were collated and divided by the number of words read during the whole test.

3.16.3 Ordinal data

Normative-empirical paradigms focus on gaining knowledge through identifying key concepts of behaviour responses to external or internal stimuli. The quantitative exploratory aspect of the research project focused on analysing the ordinal nature of the data, rather than parametric statistics (Allen & Seaman, 2007). This view is shared by Jamieson (2004) who states "methodological and statistical texts are clear that for ordinal data one should employ the median or mode as the measure of central tendency because the arithmetical manipulations required to calculate the mean (and standard deviation) are inappropriate for ordinal data" (p. 1217).

3.16.4 Procedure of survey data analysis

Descriptive statistics in the form of frequencies and percentages were used in order for the researcher to analyse and interpret what the descriptions mean. Initially, response ratings from all participants for each question were tallied. Following this, the total frequencies for each rated response were converted into a percentage calculated from the total number of participant responses for the given question. Due to the need to compare responses from two different groups of participants, back-to-back bar charts were chosen to display the percentage of responses to each question regarding 'learning'. This was deemed a more visually comprehensive display by the researcher, compared with that of

the diverging stacked bar graph frequently employed to display Likert scale data. For the 'engagement' category of the questionnaire, the percentages from the questions were displayed using a table format.

3.16.5 Qualitative data analysis

Content analysis focuses on the characteristics of language for communication (Miles & Huberman, 1994) and is suitable for researchers who wish to employ a relatively low level of interpretation, compared with higher levels of interpretation such as hermeneutic phenomenology (Vaismoradi, Turunen & Bondas, 2013, p.399). Krippendorff (2004) classifies content analysis as "…describing the characteristics of text, making inferences about the properties of the sources of the analysed text and the researcher analysing a text relative to a particular context". Content analysis is the systematic coding and categorization approach of investigating large amounts of textual information unpretentiously to determine trends and patterns of the words used, their frequency, relationships and the treatise of communication (Gbrich, 2007; Mayring, 2000). The purpose of content analyse is essentially to describe the characteristics of the document's content by investigating and examining who says what, to whom, and with what effect (Bloor & Wood, 2006).

The development of a conceptual framework and coding system is an emanating process (Creswell, 2002), in other words the codes and framework may change depending on various factors, that is questions, purpose of study or feedback/response from the respondents. Codes are labels that assign symbolic meaning to the descriptive information compiled during the study (Miles, Huberman and Saldana, 2013, p.2290) and can be seen as an important link between data collection and their explanation of meaning. Descriptive coding "…the value of interview data lies in both their meanings and in how meanings are constructed" (Gubrium & Holstein, 2002, p. 16).

3.17 Research process

The research was conducted at a local school in the Bay of Plenty as I have established social and professional networks from both living and working in this area for the past 12 years. Suitably, I have been able to establish and maintain favourable opportunities to converse and build trustworthy, respectful and working relationships with the members of educational community of who are involved in this research.

3.17.1 Sampling frame

This study focused on two groups of middle school aged students who met three specific criteria. The first criteria outlined that the students were aged between 11-12 years old and were at the time of the investigation, enrolled full time as a Year 7 student at the chosen institution. The second criterion was the student's current reading level/group. All students within Year-7 were streamed into 6 different ability reading groups which were ordered and set up by the Year-7 teachers at the beginning of the school year, based upon the students PAT and STAR reading test scores performed early in Term 1. The second criteria centred on students who were at the time of the investigation, within the two middle reading ability classes. The third criteria based around the student's exposure to iPads in the classroom. The six Year-7 homeroom classes were split in that three of the classes were blended i.e. students were required to have their own personal iPad brought to school for learning purposes, and three classes were not blended. Therefore, the third criteria centred around half of the student participants being from one of the blended classes and the other half not.

In qualitative research, sample size according to Liamputtong and Ezzy (2005) should be determined by theoretical, as opposed to statistical grounds. As the purpose of the interviews was to develop rich, in-depth comprehension of the participants' perceptions and experiences, only a small group of participants was required for a realistic population (Lodico et al., 2006), in order to provide an authentic representation of the overall treatment and control group participants.

Due to the requirement of the interviews to record the experiences of the groups of participants in a natural context (Lodico et al., 2006) random sampling was not applicable, rather 'homogenous sampling' was chosen which selects individuals who belong to a subgroup of which has defining characteristics (Creswell, 2002). With reference to this study, interview participants were chosen due to their prior survey responses.

3.17.2 Access to institutions and participants

A researcher who studies the experience of students at a school must gain access through the person who has operation of the site (Lincoln & Guba, 1985; Richardson et al, 1965), yet cannot expect access by way of 'right', rather through demonstrating that they are worthy as researchers...of being accorded the facilities needed to carry out the investigation" (Cohen et al., 2011, p.81). The school chosen by the researcher was one in which she had previously taught at in middle school level. The researcher had taught at the school for 6 years prior to leaving on maternity leave, and consequently had not taught at the school in which the study was conducted for four years prior to the study commencing and had not had any previous intervention with the middle school students. After approaching the principal and middle school teachers of the school, and outlining through planning and foresight the scope and importunities likely to be made on both the research participants (students) and the teachers involved, permission was granted to conduct the research in question. Once permission was granted by the principle and teachers, further permission was sort by the gatekeepers, as the selected participants were unable to provide informed consent without assent from their parents or caregivers. Participants of both the treatment and control group reading classes was assigned by the team leader of the chosen year group, based upon the teacher's knowledge of iPad use and their ability to facilitate its use with the participants comfortably. As the teachers employed within the study were already assigned students based on their streamed reading classes, student participants were allocated according to them already being in the selected reading class. The researcher made initial

contact with the student participants by introducing herself to the class and outlined her research intentions in an informal manner whilst remaining conscientious of the need to minimise possible Hawthorne effect, disturbing the natural behaviour of the students (Oliver, 2003) and eliminate any insecurities or feelings of powerless amongst the participants due to the presence of the researcher (Greig & Taylor, 1999).

3.17.4 Configuration of survey

Surveys were conducted at the conclusion of the reading unit. Consideration in regards to reliability, limitation of time, access to participants, and minimizing disruption to the participants was taken into account (Strange et al., 2003) and as such, self-administered questionnaire was administered to the participants in the presence of the researcher. The survey was completed by the participants independently and simultaneously, in order to ensure both response rate and completion of questionnaire was optimal.

3.17.5 Configuration of interviews

Interviews were conducted on four separate occasions over a period of two days. Four groups of 3 students were selected due to the ability to generate a wider range of responses (Watts & Ebbutt, 1987) and increasing the ability for cross-checking i.e. additional points and explanation leading to a more complete and reliable record (Arksey & Knight, 1999). The group interviews of three students was conducted during their normal reading period and the setting of the interviews was in an office next to the students' classroom in order to ensure the interview advanced comfortably and to minimise distractions (Field & Morse, 1989). Each student was invited to answer the open ended questions to maintain their motivation and participation (Patton, 1980). The configuration of the interview participants was selected based on the feeling of ease the researcher observed the students having during prior rapport of testing e.g. the student's sincerity, relaxed mannerisms and level of trust (Woods, 1986). The semi-structured interview protocol remained unchanged and was used for all four group- interviews.

3.17.6 Data transcription

At the conclusion of the interviews, the data from each interview was transcribed verbatim by the researcher. Verbatim accounts assist in establishing trustworthiness of the transcripts- a fundamental component of rigor in qualitative research (Poland, 2002, p.306). It is recommended for novice researchers to transcribe audio files prior to analysis in order to assist with minimizing researcher bias on the study's findings (Lodico et al., 2006).

In referenced to transcription, Kvale summarily states "Transcription is an interpretive process, where the differences between oral speech and written texts give rise to a series of practical and principal issues" (2008, p.1961). One of these issues is the due to the differences between spoken and written word, much of the fullness of the interview is lost in translation (Poland, 2002).

Transcripts are artificial constructions from an oral to a written mode of communication (Kvale, 1996, p.163). Therefore, speech patterns, vernacular expressions, intonations and/or emotions also play an important role in the analysis as often what is not said, is just as important as what is said (Poland and Pederson, 1998).

Prior to analysis, the transcripts were reviewed by the participants to ensure the recorded data was accurate. Participants were given a minimum of 5 days to review the transcripts before granting permission to reproduce their comments. This time period was adopted to provide the participants time without feeling the pressured to review and seek clarification where necessary.

3.17.7 Data analysis process

"Interviews are conventionally analysed as descriptions of experience, as more or less accurate reports or representations or reality" (Holstein & Gubrium, 1995, p. 1514) Once the interviews were transcribed, the researcher underwent the process of identifying, summarizing and grouping the data in order to provide an organized framework of broad categorises that encapsulated and explained aspects of the studied phenomena relative to the social world the respondents

portrayed (Holstein & Gubrium, 1995; Lodico et al., 2010).The initial review of the transcripts was reviewed alongside that of field notes, to enable a comprehensive, integrated view of the data and establish the breadth and scope of the data (Lodico et al., 2006). In accordance to the adumbrated research questions, text analysis was used to note the frequency of key words, terms and themes (Hancock & Algozzine, 2006).

The second recapitulation aimed to code and categorise the data by identifying various segments that chronicled related phenomena and through classifying these segments with broad category names (Lodico et al., 2006). This process of generalization identified both major and minor themes, and developed broad categories and themes and a coding system of the participants' meaning (Cohen et al., 2007; Creswell, 2002; Kvale, 2007; Lodico et al., 2006).

The process was repeated in order to refine the data and observe for commonalities in data both between and within interviews, in order to subcategories for information analysis (Hancock & Algozzine, 2006). Subsequent repetitions produced a coherent view of the patterns in the data (Creswell, 2002; Lodico et al., 2006). Such the process continued until a plethora was reached where additional examination was unable to provide any additional insight (Creswell, 2002).

3.18 Summary

The findings of the quantitative and qualitative data analysis are outlined in Chapter 4 (quantitative) and 5 (qualitative). In terms of the qualitative findings the researcher is aware of the exclusive control she has over the presentation of the findings. The subsequent interpretation of the findings from both the quantitative and qualitative data is discussed in Chapter 6.

Chapter Four: Quantitative Data Result Analysis & Research Findings

4.1 Introduction

The aim of the initial phase of the research project was to provide insight into the influence iPads had, when used as both an e-reader and application to middle school students reading achievement, that is, comprehension, accuracy and rate, and the students perceived learning and engagement. A number of findings emerged from applying the mixed methods design, from the statistical data obtained to measure the participants reading achievement, through to the data acquired in both the survey and interviews around learning and engagement. The level of significance (α) was set at 0.05 in line with the understanding that, if the 5% level is used, then in the case of this study as in most experimental situations it is feasible to assume that such parameters of significance will have a fair chance of picking up those effects which are large enough to be of scientific interest (Bross, 1971).

This chapter presents the analysis and findings from the qualitative data obtained through administered reading performance tests and a questionnaire.

4.1.1 Pre Implementation Results-Independent t-test

The reading achievement scores were compared before the implementation of the iPads to determine if there were any significant statistical differences between the means of the treatment and control groups. This was calculated using the mean and standard deviation for both groups using a t-test.

Table 1. *Independent t-test of Treatment and Control Groups before implementation*

Reading Comprehension					Accuracy				Rate			
Group	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**
Treatment	79.71	9.332	0.677	0.5	71.2	14.82	2.7	0.01	83.72	19.48	2.657	0.01
Control	78.04	7.222			81.4	10.48			98.17	16.89		

Table 1 illustrates that prior to implementation there was no significant statistical difference (t= 0.677, p>0.05) in reading comprehension between the participants of the treatment group and that of those in the control group, despite the treatment group having a higher *reading comprehension* average.

However, when it came to both *accuracy* and *rate*, the control group participants had higher averages than that of the treatment group. The mean score of the control group for *accuracy* (x=81.4, s.d=10.48) was statistically significantly higher (*t*=2.7, p<0.05) than that of the average *accuracy* score from the treatment group participants.

Likewise, for *rate*, the average number of words read per minute by the control group was higher than the treatment group-an average of 98.17 words per minute for the control group verses 83.72 words per minute for the treatment group. The mean scores for *rate* were also deemed to be statistically significantly higher (*t*=2.657, *p<0.05)* than that of the treatment group.

4.1.2 Summary

As the independent t-test was administered before the implementation of the iPads, there is no real relevance in the t-test results to be used to prove/disprove the null hypothesis of iPads influencing reading achievement. If anything, due to the inability for the sample groups to be randomly selected, such inequality of means in the three reading tests administered can be expected but not cause any concern.

4.2 Post Implementation Results- Pre-Test vs. Post-Test

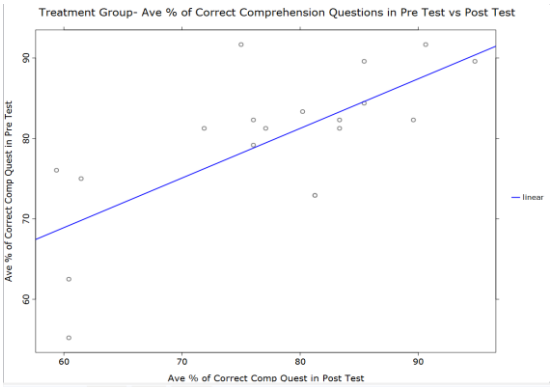
In order to answer the question 'Do iPads when used as an e-reader and application, in a middle school reading programme, influence student's reading achievement?' data was analysed from not only the control and treatment groups reading comprehension, accuracy and rate alongside each other, but also

independent of each other i.e. the correlation the pre-test and post test results had for both groups.

The mean scores in the pre and post-test for comprehension, accuracy and rate for both groups was calculated and used in the subsequent correlation analysis. The correlation between the following parameters was calculated using Spearman's correlation coefficient to measure the strength of the association of pre and post test scores within each group independently. This was completed using iNZight statistical analysis software.

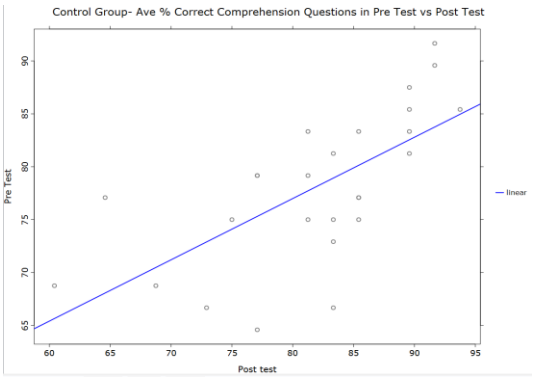
Figure 3. *Scatterplots displaying the correlation between pre and post-tests in comprehension, accuracy and rate, for Treatment and Control Group.*

Figure 3.1. Treatment Group- average comprehension score results from Pre and Post test



Rank correlation: 0.63

Figure 3.2. Control Group- average comprehension score results from Pre and Post test

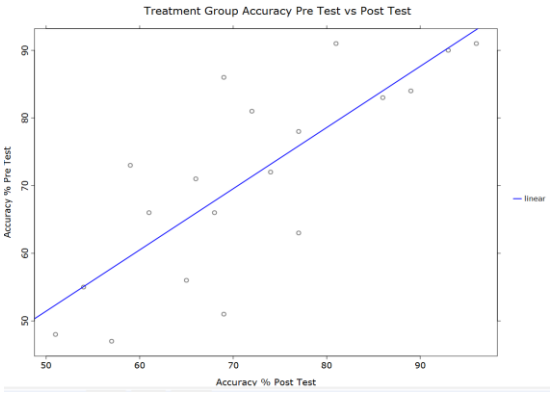


Rank correlation: 0.71

According to *figure 3.1*, there is a strong monotonic relationship (r = 0.63) between the average pre-test comprehension score and the average post-test comprehension score from the Treatment Group participants. This shows that as the pre-test results increased, so too did the post-test results. Yet, such correlation produced from the two variables are little use for individual prediction, due to the correlation yielding only a few more correct predictions than could be accomplished via estimating or by using same chance selection

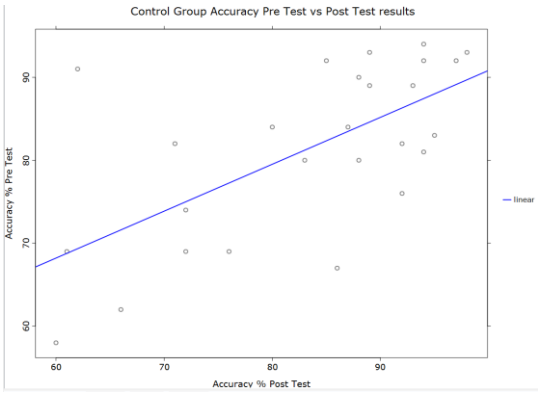
procedure (Borg, 1963). According to *figure 3.2*, there is a stronger magnitude/correlation between the pre-test and post-test score variables from that of the Control Group participants (r = 0.71). This ranking suggests that due to the strong rank correlation between the pre-test and post-test comprehension scores for the Control Group participants, group predictions can be made that are accurate enough for most purposes. In the case of this research such data can be interpreted as a prediction that for the students who do not use iPads as an e-reader and application, as their pre-test scores increased so will their post-test scores for comprehension. It is important to note however, that the correlation does not imply a cause-and-effect between the pre and the post-test scores. *Figure 3.1. and 3.2.* does not indicate that the pre-test scores relate to the post-test scores through cause and effect, rather, the general positive trend indicates that for both groups of participants the higher their pre-test score, the higher their post-test score and in terms of comprehension, there is a stronger correlation between these tests from the Control group participants.

Figure 3.3. Treatment Group- average accuracy score results from Pre and Post test



Rank correlation: 0.79

Figure 3.4. Control Group- average accuracy score results from Pre and Post test

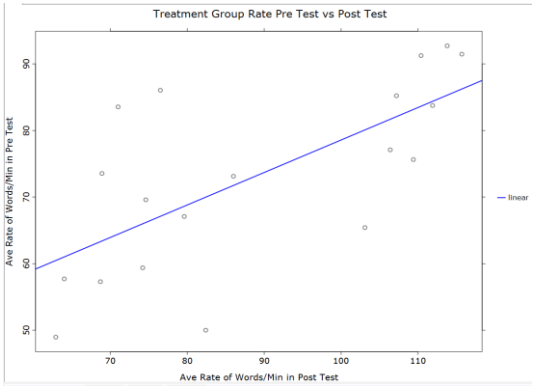


Rank correlation: 0.61

In terms of *accuracy*, according to *figure 3.3 & 3.4,* while again both the Treatment and Control Group participants produced pre and post-test results which exhibited a positive monotonic relationship between the two tests, it was the Treatment participant results which yielded a stronger correlation

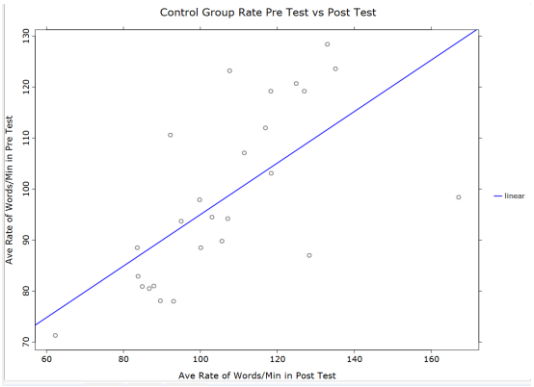
coefficient. Yet again, based on Borg's (1963) analysis and interpreting of correlation coefficients, while the rank correlation for reading accuracy exhibited a stronger relationship between the pre and post-test for the Treatment participants, both groups' rank correlations (treatment; *r* =0.79 and control; *r* =0.61) fall within Borg's range of 0.65-0.85. According to Borg (1963) correlations which fall within this range can be considered when making possible group predictions that are accurate for most purposes, but not close enough to indicate a close relationship between the pre and post-test variables for accuracy.

Figure 3.5. Treatment Group- average rate score results from Pre and Post test



Rank correlation: 0.73

Figure 3.6. Control Group- average rate score results from Pre and Post test



Rank correlation: 0.75

Figures 3.5. and 3.6. shows the relationship between the pre and post-test scores for reading rate from the two groups of participants. *Figure 3.6.* shows that the Control group scores for reading rate had a slightly higher rank correlation (*r* = 0.75) than that of the Treatment group (*r* = 0.73). Yet, while such correlations do depict a strong, positive, monotonic relationship between the pre and post-test results for reading rate from both groups, due to the range in which the correlations fell into (<0.65>0.85) again, it is possible to make accurate predictions for most purposes, but it does not indicate a close relationship between the two variables.

4.2.1 Summary

An evaluation of the monotonic relationship between the pre-tests and subsequent post-test variables for both groups indicate from the figures above, that there was a significant positive correlation between the means of the pre and also post test scores for both groups. The highest positive correlation was noted between the mean pre and post-test scores from the Treatment group for *accuracy*. As all the Spearman rank correlations fell closer to 1 than 0, this indicates that when the pre-test variable scores increased, so too did the post-test variable scores though not by a consistent amount. However, as none of the correlations equated to higher than 0.85, the relationship between the two variables of pre and post-test results for *comprehension, accuracy and rate* do not indicate a close enough relationship in order for a strong prediction to be made for either group or individual prediction.

4.3 Pre Test vs. Post Test- Significance of difference

In order to determine the influence iPads had on reading achievement, a t-test for paired samples was used as the same variable was tested at two different points in time.

Table 2. Related t-test Averages of Treatment Group for Reading Achievement

	Reading Comprehension				Accuracy				Rate			
Test	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**
PRE	79.71	9.332	0.672	0.505	71.16	14.82	0.139	0.89	81.35	10.48	0.605	0.547
POST	77.52	10.693			71.79	12.99			83.23	11.88		

Table 2. illustrates that the average *reading comprehension* score achieved by the treatment group was lower in the post test compared with that of the pre-test. However, this result is not statistically significant (t= 0.6726, $p>0.05$), therefore it can be presumed that no significant difference was found in the pre and post test results for *reading comprehension* from the treatment group.

The average *accuracy* score from the treatment group increased in the post test compared with the pre-test. Nevertheless, with a mean difference of only 0.63 and the results of the t-test concluding that this increase was not statistically significant (*t*= 0.1393, *p*>0.05), again no significant difference was found for *accuracy* in the treatment participants pre and post test results.

Table 2. also displays the average number of words read per minute by the Treatment group increased from 81.35 in the pre-test to 83.23 in the post test. Although the average number of words did increase, again this result does not appear to be statistically significant (t= 0.606, *p*>0.05). This t-test result outlines there is no difference between the number of words read per minute from the pre-test to the post test for the treatment group.

4.4 Control Group reading achievement -significance of difference

A paired t-test was also conducted on the control group to compare and conclude the overall influence iPads had on the treatment group.

Table 3. Related t-test Averages of Control Group for Reading Achievement

Reading Comprehension					Accuracy				Rate			
Test	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**
PRE	78.04	7.222	1.737	0.0888	81.35	10.48	0.6051	0.55	98.17	16.89	1.492	0.142
POST	81.81	8.386			83.25	11.88			106.3	21.85		

Table 3. indicates that, unlike that of the treatment group's comprehension average decreasing from pre to post test, the control group increased their average from 78.04 in the pre-test, to 81.81 in the post test. Although these figures have a difference in mean of 3.77, again these results, while closer in statistical significance than the treatment groups reading achievement results (t=1.737, *p*>0.05) they are not quite significant enough to qualify any important difference.

The accuracy result illustrates an increase in the control group participant's accuracy from 81.35 to 83.25. However, it can be concluded that this increase is not significant statistically (t=0.6051, *p*>0.05).

In terms of the number of words read by the control group per minute, this too increased from the pre-test (98.17) to the post test (106.3). This indicates a mean difference of 8.13 words but such an increase did not calculate to be considered of any statistical significance (t=1.492, *p*>0.142)

4.4.1 Summary

Although the average success level of the three reading achievement tests was higher for the control group for both the pre and post-tests, none of the pre and post tests for both the groups were considered to be of any statistical significance. Therefore, it can be concluded from this quantitative data analysis, that the three tests used to determine reading achievement used as both a pre and the post test for the treatment group, show no difference and consequently support the null hypothesis that iPads when used as an e-reader and application did not influence the overall reading achievement of middle school students.

4.5 Post Implementation Results- Treatment vs. Control (Independent t test)

Due to the statistical significance outlined in *Table 1* highlighting the differences in mean between the treatment and control groups *accuracy* and *rate* results, another independent t-test was conducted using the post test results of each of the three tests to see if any improvements had been made.

Table 4. *Independent t-test of Treatment and Control Groups results after implementation*

Reading Comprehension					Accuracy				Rate			
Group	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**	**x**	**s.d**	**t**	**p**
Treatment	77.52	10.693	1.508	0.1387	71.79	12.99	3.0675	0.0037	88.77	19.33	2.7801	0.008
Control	81.81	8.386			83.23	11.88			106.25	21.85		

Prior to implementation, there was no significant difference between the treatment and the control group reading comprehension average scores. When both group's post test results were compared and analysed, again there was no statistically significant difference between the results, (t=1.508, p>0.05) despite as noted previously, the control group participants achieving higher post test results for reading comprehension than those in the treatment group.

Pre-implementation results for accuracy implied that there was a very statically significant difference of pre-test result between the control group and the treatment group. As highlighted before, this is often the case due to the inability of the groups to be randomly selected. Post-test results as illustrated in *table 5*, imply that there has been no change in statistical significance from that of the pre-test results as the average accuracy post test results again show a very significant difference from the control group to the treatment group (t=3.0675, p<0.05).

The most relevant change worth noting was that of the degree of statistical significance between the control and treatment groups' pre and post test results for rate. *Table 1.* illustrated the average number of words read per minute (rate) between the control group and the treatment group before implementation, exhibiting statistical significance (t=2.6569, p=0.011) although such the value of p proving the statistical significance does not classify a 'strong difference between the two means. Conversely, table 5 shows that the words per minute read by the treatment group was lower at 88.77 words, compared with that of the 106.25 words read per minute by the treatment group. This result shows a very statistically significant difference between the two groups of participants (t= 2.7801, p= 0.008), much more than that outlined before the implementation of

the iPads. Consequently, the statistical significance of the differences in means between the control and treatment group for rate has increased from that of the beginning of the study.

4.6 Statistical Content Summary

While earlier conclusions indicated from the data analysis that in this study, iPads did not influence reading achievement i.e. comprehension, accuracy and rate combined, such results like that achieved through the independent t-Test of accuracy, resolve that there was a greater difference in the average reading of words per minute from the control group to the treatment group once the iPads had been used as an e-reader and application for the 5-week duration. While according to the pre implementation t-test results, the average reading rate from the treatment group was lower than that of the control group, this difference became even more significant at the conclusion of the study, whereby although both the groups improved in their reading rate ability, the treatment group participants compared to their control counterparts were significantly slower in their reading rate ability, more so after the 5-week study.

4.7 Survey Introduction

At the conclusion of the five-week study, a paper based questionnaire was administered by the researcher, to both the control and treatment group participants in a classroom environment and was completed by the participant's individuality, silently and without comparison. The questionnaire contained eleven closed ended questions using a rating scale (Likert) and three open ended questions. The questionnaire was broken down into three categorical sections. The first section related to the participants' level of enjoyment and ease of reading during the five-week novel study, while the second and third sections

were specific to the participants perceived levels of learning and engagement they experienced throughout the duration of the unit.

The closed rating scale questions provided the same range of responses for each question, illustrated by a supporting cartoon emotive face to create a more 'user friendly' questionnaire for the participants. The categories used for the rating scale were 'Strongly disagree/disagree/not sure/somewhat agree/strongly agree'. The respondents indicated their opinion by circling or highlighting the position on the scale (with the emotive face & writing) which most represented how they felt.

The treatment group was administered a questionnaire relating to the use of iPads as a e-reader and application during the reading unit, as well as rating their learning and engagement levels when completing the reading unit work. Likewise, the control group's questionnaire also asked the respondents to rate their level of learning and engagement during the reading unit, however as the control group did not have access to iPads, their questions related to their ability to read the traditional printed text book, and complete the corresponding written activities.

The survey was used to investigate the following question,

'Do iPads, when used as an e-reader and application as part of a middle school reading programme, influence students' perceptions of their learning and engagement levels?'

The questionnaire was administered to a total of 40 participants, 17 from the treatment group and 23 from the control group. Two participants from the treatment group and three from the control, did not complete the survey due to being absent on the day it was administered.

The survey was completed by the participants at the same time using 'test like' conditions in that it was silent, covered work, not discussion or copying others etc. All respondents completed the survey within the 20 minute allocated time frame.

4.8 Contentment of set reading tool

The initial question in both groups' survey asked the respondents to rate their level of enjoyment in using the specified tool provided (iPads for treatment group & printed text books for control group) to read the set novel).

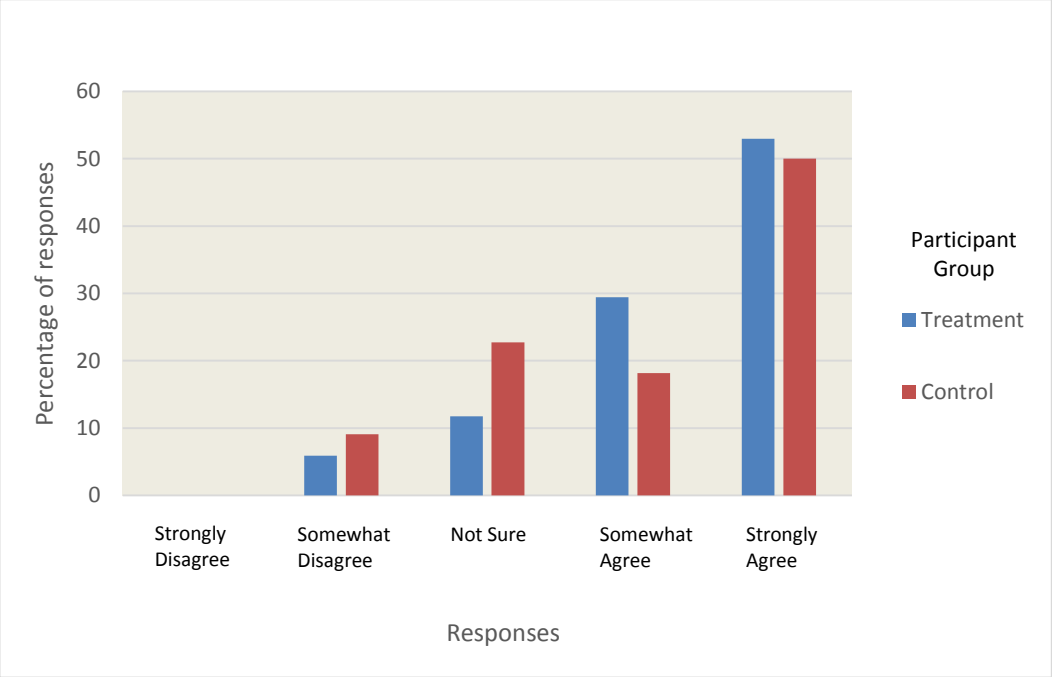


Figure 4. Comparison of responses from the treatment and control group participants regarding the question 'I enjoyed using the iPad/text book when reading the set novel'.

As shown in *figure 4.*, it appears that the control group expressed great satisfaction when reading using the printed text books, however a higher proportion of the treatment group participants (83%) somewhat or strongly agreed to high levels of satisfaction when using the iPad as an e-reader compared to that of the control group (68%). There was a higher amount of uncertainty within the control group participants (22%) as to their rating of enjoyment in using the set reading tool throughout the duration of the unit. A

similar response was expressed in both groups in regards to lack of enjoyment from using either the iPad or text book.

4.9 Perceived learning

Questions relating to the participants' perception of the learning that supervened during the study can be divided into two subcategories. The first relates to learning in the form of content and in the connection of new ideas, while the second can be collated into the overall enhanced learning experience, developed confidence and understanding. It is to be noted that the reading 'activities' that supported the given text were completed by hand written work from the control group participants and by use of pre-selected applications on the iPad from the treatment participants.

4.9.1 Perceived learning- Content and Connection

Respondents were asked to rate their perceptions of the psychosocial learning environment of their reading class during the 5-week study. The first two questions related to their surmise on how the reading activities supported their learning, and how the activities supported them to connect new knowledge and ideas

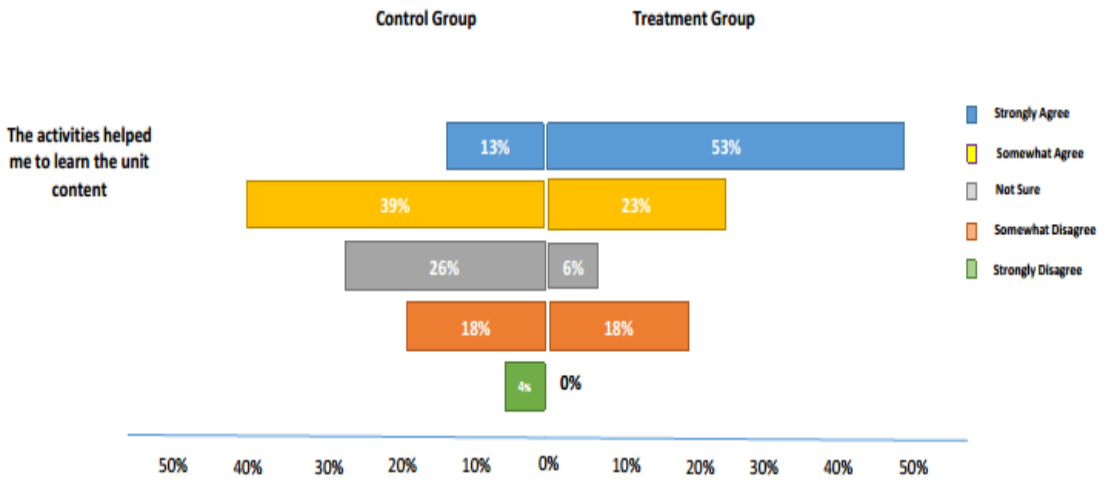


Figure 5.1 Comparison of rated responses from the treatment and control group participants on their perception of how the reading activities supported their learning of content

The overall perception of learning new content, from both groups of participants was positive as shown in *figure 5.1* While a small percentage of participants from both groups (18%) were unanimous in their conjecture that the activities had not supported their learning, over half of the participants expressed satisfaction or high satisfaction with regards to the activities assisting their learning of new content. Surprisingly, over three quarters of participants (76%) from the treatment group agreed or strongly agreed that the iPad activities were succour to their learning in reading, compared with just over half (52%) of respondents from the control group. Over a quarter of control group respondents (26%) were unsure if the activities supporting their learning, compared with just 6% from the treatment group.

A similar result was observed when participants were asked about the role the activities had in providing new learning connections. *Figure 5.2* illustrates again the response from both groups of participants was largely positive. However, a higher percentage of treatment participants (76%) credited the iPad activities with the connection of new ideas, compared with just over half (53%) from the control group who were supportive of the written activities. Again, more than a quarter of control participants were unsure if the writing activities were responsible for the connection of new ideas and surprisingly, over one fifth (22%) of responses from this group were dissatisfied or highly dissatisfied with the activities ability to support them in making new learning connection, compared with 6% of treatment participants.

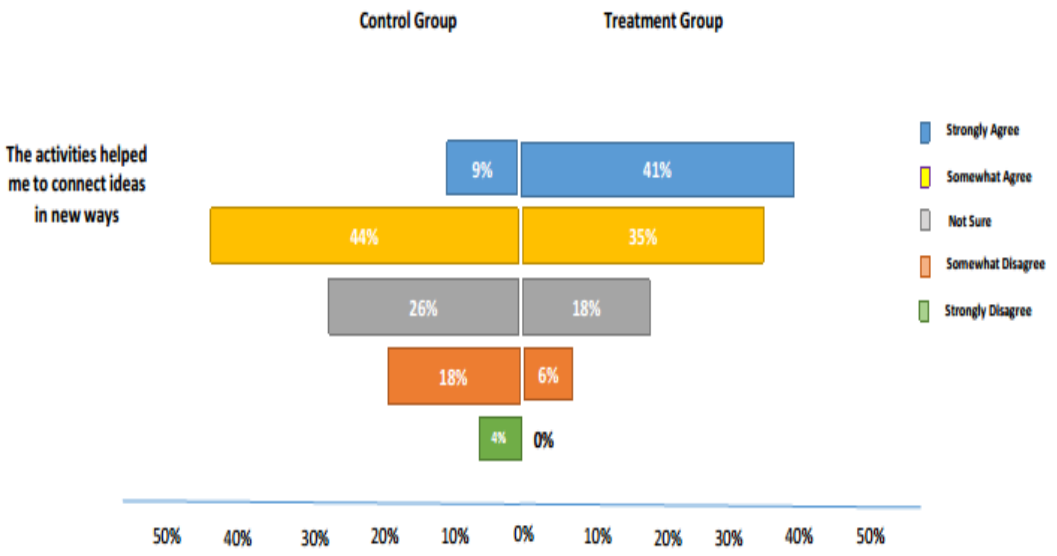


Figure 5.2. Comparison of rated responses from the treatment and control group participants of their perception of how the reading activities assisted in new learning connections.

4.9.2 Summary

A simple analysis of the data from the perceived learning of content and connect questions would indicate that the treatment participants had higher levels of perceived learning of content than that of the control group participants and were more confident in their perspicacity of their learning. Interestingly, the same numbers of respondents were dissatisfied with how the activities assisted their learning, regardless of which group they were in.

While some researchers may question the comparable nature of the two perceived learning content and connection questions, as often by definition, learning is seen as 'making new connections' or the 'connection of new ideas', this was the intention of the researcher. While the results could be concluded that due to the similar result in responses, the respondents understood the question to be similar in regards to learning, there is cause for concern in that the question could have been interpreted wrong by both sets of participants. Within the question, the phrase 'new ways' could be interpreted by the participants as completing the activities in a different fashion compared with previous reading units. As such, the high level of satisfaction from the treatment

would be from their interpretation that using an iPad as a tool in order to complete the activities was a 'new way'. This would be supported by the results from the responses of the control participants who at just under half (48%) did not believe the activities helped them to connect ideas in new ways or were unsure, as they were completing the activities in the same written fashion as in other reading units prior to the study. For future reference, the question would be better suited around clarifying and highlighting 'learning connections' rather than 'new ways and ideas'.

4.9.3 Perceived learning- Enhancement, Confidence and Understanding

The following data analysis was completed on questions asked in the survey around enhanced learning, confidence and understanding. As shown in *figure 5.3*, below, none of the participants surveyed expressed a strong negative belief of the activities inability to enhance their learning. The overall response from the treatment group was positive, with no participants expressing concern over the activities inability to enhance their learning. These figures also indicate that quite a few respondents were unsure as to whether their learning was enhanced by the set activities. This was possibly due to the absence of an end of unit test and the participants' incapability to evaluate their learning in a more diagnostic manner. Over half of the control (53%) and treatment (58%) responses observed in *figure 5.3,* were of the opinion that the activities assigned to them enhanced their learning with just over two thirds of treatment participants (41%) showing high levels of satisfaction in the enhancement of their learning.

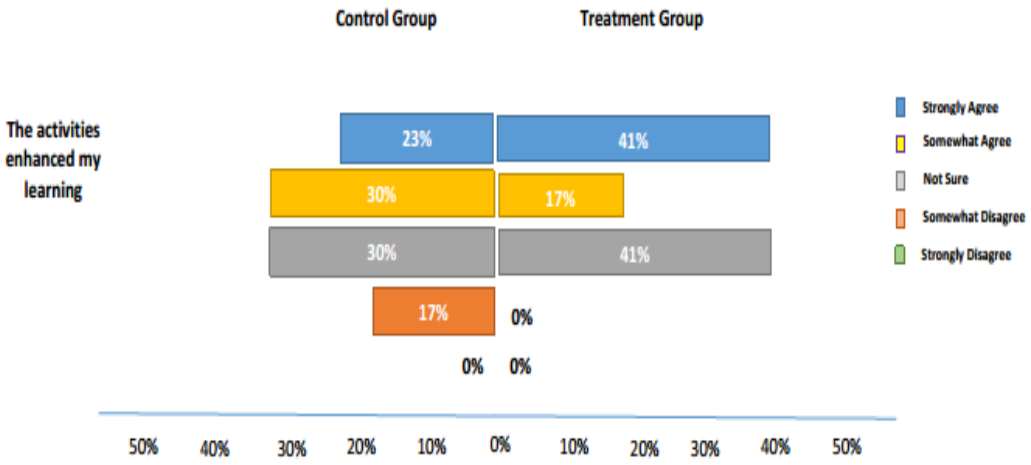


Figure 5.3. Comparison of rated responses from the treatment and control group participants of their perception of how the reading activities assisted enhanced their learning

In comparison to the earlier question regarding perceived learning of content, similar figures can be observed from *figure 5.4,* when respondents were questioned about the activities ability to assist in the participant's development of their confidence in reading. Over 75% of respondents from the treatment group were satisfied or highly satisfied in the activities ability to develop their reading confidence, compared with just half of those in the control group. Almost a third (32%) of respondents from the control group expressed negative perceptions and were not assured the writing activities developed their confidence in reading.

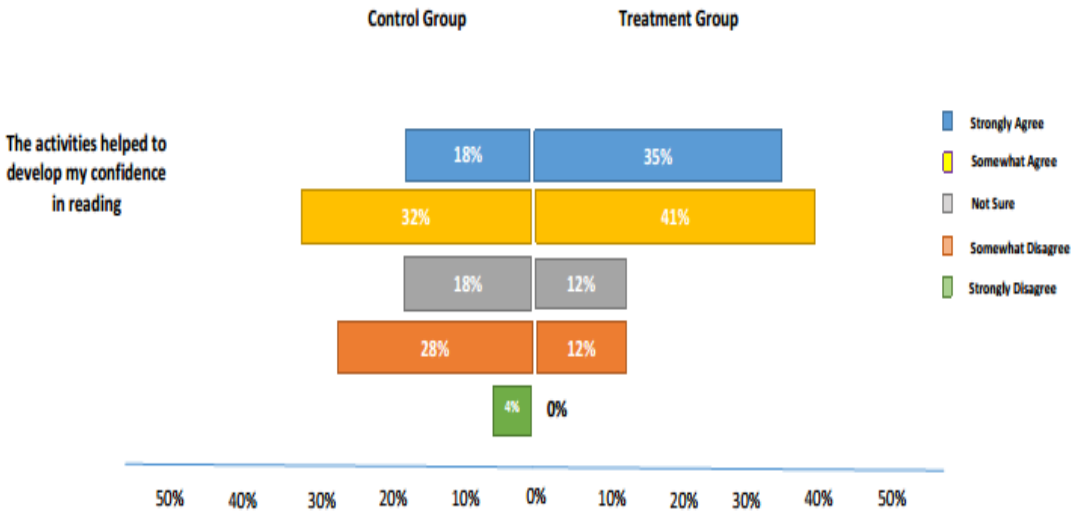


Figure 5.4. Comparison of rated responses from the treatment and control group participants of their perception of how the reading activities assisted in developing confidence in reading

Overall perceptions of developed reading comprehension skills were positively tantamount for both groups. According to *figure 5.5*, more than a third of respondents from the treatment group (35%) were unsure as to whether the iPad activities they engaged in assisted in the development of their reading comprehension skills compared with just over a fifth of those in the control group. Consequently, while a few respondents from the control group (13%) did not believe the activities enhance their reading comprehension, none of the participants from the treatment group were dissatisfied with the activities enhancing their understanding of the set novel. Rather, a contraposition perspective was held by over a third of the treatment group participants who were highly satisfied with the belief of the iPad activities aiding in the understanding of the novel.

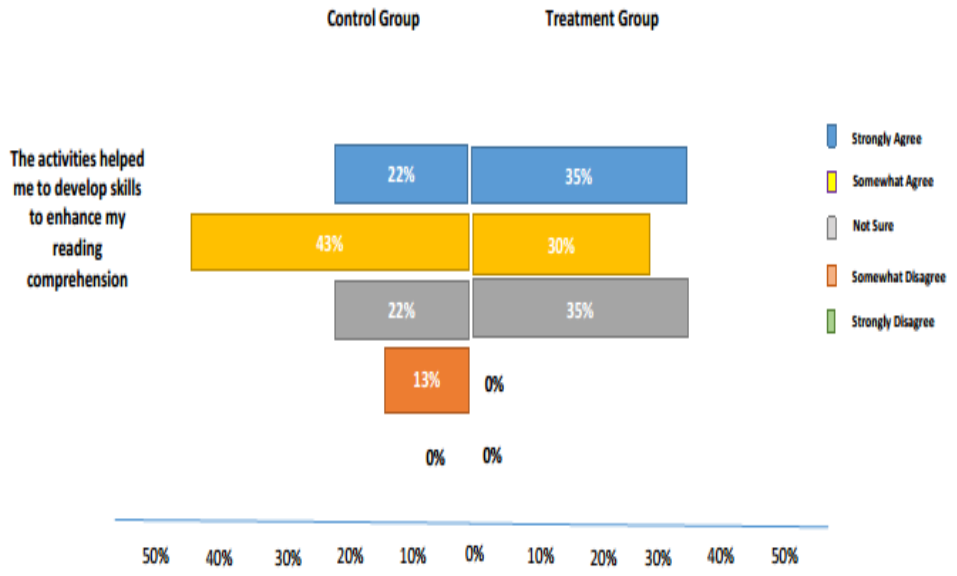


Figure 5.5. Comparison of rated responses from the treatment and control group participants of their perception of how the reading activities assisted in developing their comprehension

4.9.4 Summary

The data obtained from the questions regarding respondents learning through the enhancement, confidence and understanding overall depict a positive image for the set reading activities without discriminating against either that of iPads or hand written bookwork. The control group participants were consistent (50-60% responses) in their opinion that the prescribed written activities supporting the reading text, were of benefit in the enhancement of their learning and understanding of the text as well as in the developing of their confidence in reading.

However, the same data illustrates a higher level of satisfaction from the treatment participants who were more confident that the use of an iPad as an application to complete the set activities had enhanced their learning, confidence and understanding. As such, none of the respondents who used an iPad in reading, questioned its ability to enhance their learning or comprehension, compared with that of the control participants (13-17%) who were of a contradicting opinion.

4.10 Perceived Engagement

Questions relating to the participants' perception of their engagement that supervened during the study were based upon motivation, focus and in comparison to other reading units the participants had completed. The control group participants were also questioned about their preference to working either in pairs or as part of a group when completing the reading activities.

4.10.1 Participants' Engagement

The final category of closed Likert scale questions from the survey were in relation to the participants' perceived levels of engagement throughout the study. Words such as participation, focus and motivation were used to further

define 'engagement' for the respondents so the possibility of question misinterpretation was kept to a minimum.

Table 5.1. Comparison of rated responses from the treatment and control group participants of their perception levels of motivation during the reading unit

I was motivated to learn during the reading unit					
	Strongly disagree	Somewhat disagree	Not sure	Somewhat agree	Strongly agree
Treatment	0%	12%	6%	17%	65%
Control	0%	14%	4%	30%	52%

According to *figure 5.1*, the execution of the reading activities had no effect on the motivation levels of the participants to learn throughout the reading unit. Surprisingly, both groups were in concordance (82%) of their high levels of motivation to learn throughout the unit. A similar result between the participants (12% treatment and 14% control) was observed to of had a lack of motivation during the unit to learn.

While both groups of participants showed equal levels of motivation towards learning during the unit, *figure 5.1* demonstrates a high number of respondents from the treatment group (82%) acknowledging that they participated more during the reading unit with their iPad then previous reading units when their iPads were not available for use to them. Nevertheless, the opinion around increased participation levels was also shared by almost three quarters (73%) of participants who did not have access to an iPad. A similar number of respondents from both groups were unsure of their levels of participation in comparison to other units as well as that who perceived their participation to be less compared with other reading units.

Table 5.2. Comparison of rated responses from the treatment and control group participants of their perception levels of participation during the reading unit

I participated more during this reading unit compared with previous novel studies					
	Strongly disagree	Somewhat disagree	Not sure	Somewhat agree	Strongly agree
Treatment	0%	6%	12%	41%	41%
Control	5%	5%	17%	23%	50%

Interestingly, although the participants from the control group actively reflected positively high results in their motivation to learn and level of participation throughout the unit, just over half (52%) admitted to remaining focused and attentive when required to complete the handwritten bookwork activities. This is a stark contrast to the responses from the treatment participants (82%), who as well as exhibiting high levels of motivation and participation, also accede to actively remaining focus and attentive when completing the activities using their iPad. While a small percentage of control participants (17%) admitted to being distracted during the activities none of the participants expressed high levels of inability to remain focused, unlike that of the treatment group (6%). Yet just under one third of control participants (31%) were unable to reflect on how well they had focused and attentive throughout the completion of the activities.

Table 5.3. Comparison of rated responses from the treatment and control group participants of their perceived focus and attentiveness when completing the reading activities.

I remained focused and was attentive when completing the activities					
	Strongly disagree	Somewhat disagree	Not sure	Somewhat agree	Strongly agree
Treatment	6%	0%	12%	18%	64%
Control	0%	17%	31%	35%	17%

4.10.2 Summary

As the above evidence illustrates, the execution of the reading activities by either iPad application or handwritten bookwork, did not affect the participant's motivation to learn. High levels of participation throughout the unit were recorded by both groups yet the results suggest the use of an iPad as an application may have assisted in keeping the participants engaged when completing the set activities.

4.11 Participant recommendations

Open-ended questions towards the conclusion of the survey for the treatment group participants, provided insight into the participants' overall opinions around their preference of using iPads as an e-reader compared with that of printed text books. Not only were the treatment participants' preference between e-readers and printed texts noted, but the final open-ended question divulged further into investigating the attributes the participants who preferred to read on iPads liked the most.

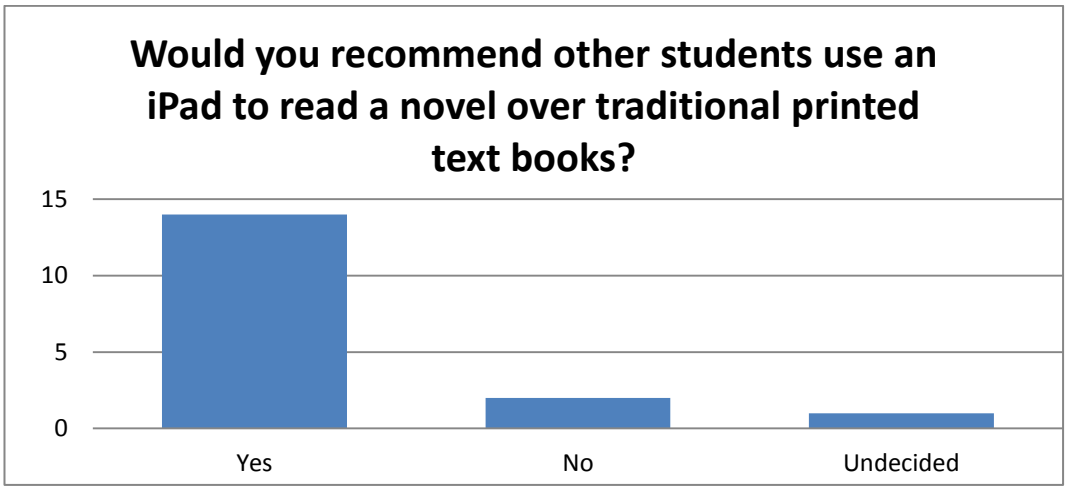


Figure 5.6. Responses from Treatment participants recommending iPads over traditional printed text

According to the survey results presented in *figure 5.6,* a total of fourteen out of seventeen responses (82%) favoured the use of iPads as an e-reader compared with that of traditional printed text. Two respondents (12%) did not recommend the iPad as an e-reader, while one respondent was unsure. It is to be noted that the students who were using iPads had previously used printed text books to read during the reading lessons, prior to the study commencing.

When the researcher investigated further and respondents were questioned regarding their reasoning for preferring the iPads as an e-reader the following responses were noted and displayed according to *figure 5.7*. All participants were given the opportunity to make general observations and comments as to

the features the iPads have which make them more attractive as a reading tool, compared with that of printed text.

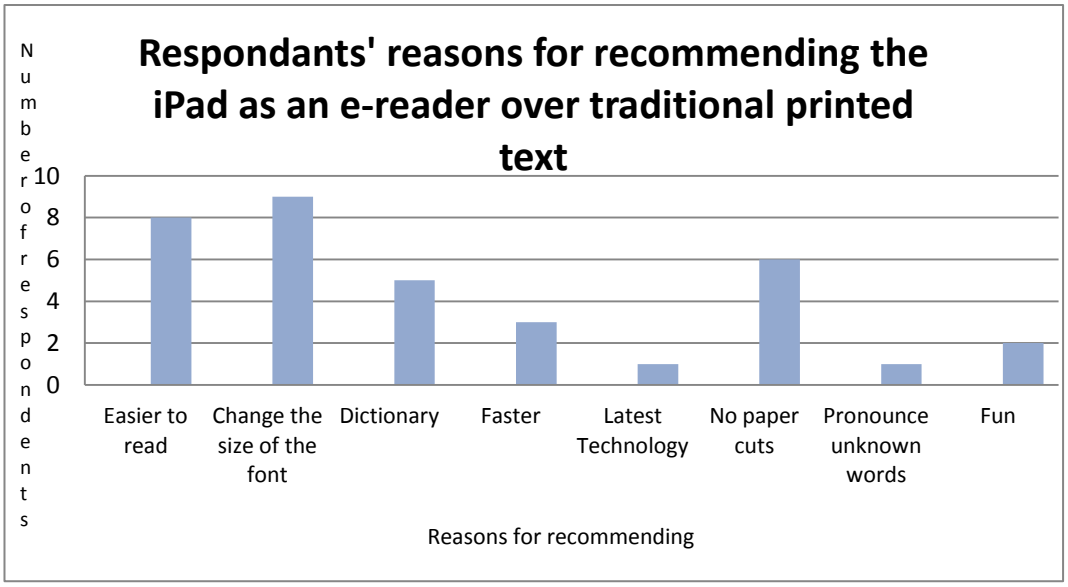


Figure 5.7. Reasoning responses from Treatment participants recommending iPads over traditional printed text

There is a clear grouping of comments that infer to the potential value the iPad has according to the respondents, compared with that of printed text. Over a quarter of responses (26%) equated to the most popular reason for recommending the iPad as an e-reader to others was due to the iPads ability to change font size when reading. This was followed by the recommendation that iPads were easier to read compared with printed text (23%). Other features specific to the iPad were also noted as recommendations such as the dictionary feature (14%) which enabled the participants to look up the definition for words they were unsure about in the text as well as pronunciation (3%) whereby the participants could listen to words they presented with in text, pronounced correctly. Respondents (17%) also recommend using iPads over printed text to avoid haphazard paper cuts.

4.12 Chapter Conclusion

The investigating question at the core of this research project was to explore if iPads when used as an e-reader and application, in a middle school reading programme, influenced student's reading achievement and perceived learning and engagement. A more in depth discussion around the research findings is covered in Chapter 6, however, a brief conclusion to the research question is that the observed results from the data analysis indicate that despite one group of participants using their iPad as an e-reader and completing the required activities using supportive applications, their reading achievement in the form of comprehension and accuracy was not impacted or influenced either positively or negatively over the 5-week duration of the study. While it is important to acknowledge that those participants who were exposed to iPads during this study did improve in their reading rate, comprehension and accuracy, their improvements were of no significant difference to the improvements made by the control group participants, who read paper based text and completed the supporting activities in their written workbooks. The only observed significant difference between the two groups of participants was that of reading rate. Initial findings found at the start of the study, observed that the control group had a significantly difference when it came to the number of words they could read per minute compared with that of the treatment group participants. Overall, the participants of the control group were able to read at a faster rate than those from the control group. Concluding tests found this statistically significant difference in reading rate had increased in the 5-week time frame.

However, the concluding reading rate test itself may be questioned, as both sets of participants were required to read off paper based text. This may be seen by some as bias as the treatment group had spent the duration of the study reading off an electronic device and therefore to be consistent, should have been tested for reading rate on a familiar format in the form of an iPad or e-reader.

Survey results were analysed to determine whether using an iPad as an e-reader and application influenced the participants' perception of their learning and

engagement in reading. Overall survey results indicated that on average, most of the participants were satisfied the activities corresponding relevant content, had improved their learning. A surprising amount of responses from the treatment participants indicated that there was a common perception that using iPad applications helped to develop their skills in understanding the e-book they were studying and increased their confidence in reading.

This perception from the treatment group possibly correlates alongside the increased levels of engagement and motivation the treatment participants recorded, whereby the desire and drive to engage in and complete the activities in their opinion resulted in increased learning.

Chapter Five: Qualitative Data Analysis & Research Findings

5.1 Introduction

The second phase of the study was adopted by the researcher with the intention of collecting qualitative data and analysing it, to clarify and attempt to justify the statistical results attained by phase one of the study. By exploring the participant's views in a more reflective manner, the researcher endeavoured to gain greater insight into the research question;

'Do iPads when used as an e-reader and application influence middle school students perceived learning and engagement in reading.'

This chapter is designed in a thematic format and outlines the extent of the participants understanding of engagement and what they observe and perceive it to look like in a reading class environment. Furthermore, this chapter also addresses the participants' perceptions around learning and collaboration.

Participant 'voice' has been given through researcher-selected quotes which articulate their perceptions, experiences and understanding in an honest and sincere manner. In order to preserve authenticity, the quotes have not been altered and as such, have been transcribed exactly as spoken by the participant during the interview process.

5.2 Engaging in Engagement

Throughout the conversations with the participants of this study, it was evident that each had their own personal view, not only of their definition of engagement, but also of what engaging in class activities 'looked like' from an outsider's perspective. Many participants appeared to directly associate engagement with that of 'focus' and in 'exhibiting interest' in a classroom reading activity. Miss A, a participant from the treatment group, when discussing what 'being engaged in a class environment means' commented "*being focused and absorbed in whatever you are doing.*" Many of the participants in this study

conveyed an understanding that engagement could be associated with 'interest', as it was prevalent for comments from participants of both groups to repeatedly highlight their understanding that being engaged in class was an act of being interested and involved in the prescribed learning activities. Master B and Miss C, both control group participants, expressed their beliefs clearly as Master B stated "*Getting it done, being interested and talking about the book*", while Miss C conveyed her sentiment as *"they'll kind of be more like asking questions about the story and the book and wanting to learn."*

5.2.1 Comparison of Perceptions

Whilst analysing the comments around engagement from both groups of participants, it was noted that both groups were of similar signification regarding the definition of engagement. However, when discussion evolved around what engagement 'looked' like in a classroom, the researcher observed significant differences in the perceptions of the participants from the two groups. Control group participant comments often referred to perceptions of diligence and completion of work. Master D, from the control group elucidated *"Umm, they always have their head down working and are interested*". This was not an isolated comment as a comment of similar nature was narrated by Master E who interpreted engagement within a reading class to be like a student "*looking at their book".*

Contradictory, comments made by participants from the treatment group tended to perceive engagement in reading class as more of a sociable encounter. Throughout the discussion of what engagement looked like with treatment participants, often the comments related to 'working together' and collaborated social participation rather than completion or striving to complete work. Miss A, commented on what engagement looked like to her as "*being involved and learning with other people and talking about different ideas and getting involved."* Likewise, Miss F was able to elaborate on what Miss A had previously stated by saying *"Umm, I guess it's working as a team, you know, like working*

with the people around you and helping each other." The other five treatment group participants involved in this research were complimentary to the opinions and perceptions expressed by Miss A and Miss F. Their responses indicated an interpretation of engagement within a reading class to be linked with social interaction alongside that of enjoyment and collaboration within the students involved.

5.3 Perceptions around learning

5.3.1 Enhancing learning through enjoyment

Student perception of learning is a strong indicator of student success (Mango, 2015). This is due to student perceptions affecting their individual satisfaction levels, subsequently influencing their studies due to the time and effort they purposefully exert, enhancing their learning and personal development (Kuh et al., 2006). As the interviews turned attention towards learning and enjoyment, the student participants were sanguine when conveying their knowledge and understanding. The overall consensus from the students indicated that most were adamant that students per say, were inclined to learn more if they enjoyed the participated reading activities. A participant from the treatment group, Miss G, relayed her aphorism of how/why student learn more by commenting "*Cause it kind of holds the student's attention and makes them want to read it more and like, yeah, they enjoy it"*. Miss G's body language conveyed enthusiasm and assurance as she commented forthrightly, while indicating earlier that she rated her enjoyment of the class reading activities as a "*4 out of 5*" for the unit.

What became apparent through the course of the interview questions regarding levels of enjoyment and learning was the frequent comments from the participants associating 'learning' with that of 'participation' and 'interest'. Discussions with both groups of participants tended to be able to consociate when expressing their definition of enjoyment as 'fun'. Master E articulated "*If they (students) are enthusiastic about it, so they are like 'I'm going to read this book because it is fun'."*

However, discussions tended to be devoid of any knowledge or understanding of how substantive learning itself, was enhanced through enjoyment. Treatment group participant Miss J, who had indicated from previous comments earlier in the discussion, her somewhat apathetic attitude towards the reading activities (observed by the researcher from her rating her level of enjoyment a *"3 out of 5"* and nonchalant body language throughout the interview) recounted *"Like, some books I find really boring but some books are really interesting and the activities are really interesting, also like I want to do the activities more."* A similar opinion in terms of participation was observed from Miss C "*Yes, if they enjoy the activity then they will want to do the activity, if they don't want to do the activity then they'll kind of just let it drag on for like ages and ages...*"

The other participants included in the interviews also indicated a partial and fragmented understanding of what learning 'looked like'. The data showed that while student interview participants were united in their belief of enjoyment increasing levels of learning, they exhibited an absence of cohesive, cogent understanding of how academic learning itself is enhanced through enjoyment. It was evident that the participants, due to their juvenile mind-set, lacked the depth and breadth of knowledge about learning and its cognitive processes.

5.3.2 The learning activities

In terms of the learning activities, both groups were introduced to the same genre of activities. The prescribed activities were designed in part, from collaboration between the researcher and the teachers involved in the study. The tasks were established around Sheena Cameron's *Reading Comprehension Strategies* including *prediction, vocabulary, comprehension, and visualisation* (Cameron, 2009). As previously mentioned in chapter 3, the difference between the two groups of participants was the tool in which the participants read from (text book vs. iPad e-reader) and the format in which the activities were completed- either handwritten or via the use of iPad applications.

5.3.3 Satisfaction of the learning activities

Throughout the reading unit, participants were introduced to a variety of learning activities and questions, aimed around strengthening their reading comprehension skills. As the researcher discovered that previous conversation with the participants had concluded that often they defined being engaged as 'having fun', it was of interest to the researcher to find out which activities the participants enjoyed the most from the completed unit. When participants from both groups were questioned regarding what activities they enjoyed the most, there were similar responses between the two groups of participants. A common response from the control group participants, who predominantly completed their activities using paper and pencil, was that they enjoyed the drawing activities within the unit rather than the writing. Both Master B and Miss C from one control group interview and Master D from another control group interview agreed that they all enjoyed the activities that incorporated drawing more than the activities where they were required to simply write down their answers, comments or predictions as they did not like *"heaps and heaps of writing".*

Treatment group participants when discussing the same question expressed their preference to the learning activities which involved collaboration with other class members. Miss K relayed with a sense of certainty, the activities she enjoyed the most were "*When some of us went into groups because yes they taught us a lot."* Similarly, Miss G further elaborated on Miss K's comment by saying *"It was fun to work as a class together."* Half of the treatment participants who were interviewed recounted their most enjoyable learning activity as being activities that allowed them to work together either as a class or as part of a team.

When discussion was directed toward whether or not the set learning activities supported the participants learning and understanding of the novel studied, again both groups were antithesis in their responses. None of the control group participants postulated the learning activities really aiding their understanding of the novel. Master D's nostalgic response was "*Umm, sort of, it kind of felt like just reading the book",* to which Master B agreed and replied *"Same".* Other

control group participants believed that the learning activities and questions were a form of revision of the storyline rather than supporting their comprehension.

This view was a stark contrast compared with the treatment group participants who were interviewed. All the interview participants from this group were united in their belief that the activities somewhat supported their learning and understanding of the novel, through questioning and in encouraging the participants to think deeper and more critically. Such was the discussion between Miss F, Miss G and Miss L who were interviewed together, whereby Miss F alleged "*If you read the book, then you have the questions (activities), it tells you, you have to revise it*". This was followed by Miss G stating, *"Yeah, I think it's a good idea to do the questions because it helped you understand what you'd just read".* The discussion concluded with Miss L mentioning *"Yeah, I really liked the activities cause some were really tricky so you had to think about how you were going to do them."*

It is important to acknowledge that the control group participants, although unified in their perspicacious belief that the activities (questions) did not appear to support their learning and understanding of the novel, at no time did the conversation indicate that the participants from this group did not find value in completing the activities and answering the questions.

5.3.4 Participant attitudes towards learning

When it came to the interview participants expressing their levels of enjoyment throughout the designated reading unit, the overall perceived levels were optimistic. Eight of the eleven participants, when interviewed at the conclusion of the unit, rated their level of enjoyment either a *four* or *five* out of five, with the understanding that a one represented a very low level of enjoyment and a five the highest level. When further questions required the participants to elaborate on why they had given these scores, comments varied between

"reading the book" to completing the question activities which assisted in their understanding. On the contrary, Master I, a control group participant appeared to be somewhat impugn when conveying his feelings regarding his level of enjoyment. He rated his level of enjoyment as *"a two and a half"* and further along in the interview often scoffed and sniggered when questioned as to whether or not the reading unit had supported him in the way he learnt best. His body language and responses were a reflection of his lackadaisical attitude in that when questioned if the reading activities supported his understanding of the novel, responded *"Umm sort of, it kind of felt like just reading the book."* Master I further disclosed throughout the interview his belief that he was a kinaesthetic learner and preferred to learn by 'doing'. As such when asked what recommendations he would like to make in order to improve the reading unit, he proposed the idea of using and iPad as a tool to *"find information better."*

5.4 Socialisation and Collaboration

5.4.1 Socialisation and perceived learning

While previous conversation between the interviewer and the participants, focused around forms of engagement and levels of learning, one of the pressing questions arose in what type of learning environment the participants believe they worked best in? During the scheduled reading classes, did the participants perceive themselves learning more when they worked as individuals on a task, or as part of a pair or small group (3-5 people), and why did they think this way? The above questions were worded in order to gather data from the participants by inviting them to critically reflect on their metacognitive processes, while conveying their thoughts about what learning environment they felt they learnt best in, regardless of the current environment they had been employed into amid the length of the study.

5.4.2 Participant Responses

The responses yielded data which showed mixed preferences between the interviewed participants. Three of the participants, Master D, Master E and

Master J, all form the control group indicted that they learnt more when they worked by themselves. Master J explicitly stated *"For me, it would be by myself because I hate it whenever I'm in a group and there's always one guy that has to go ahead and say 'No, this is the correct answer…'".* Master J's body language was mostly unambiguous throughout the interview process yet, when answering the question about learning environment preferences, appeared to exhibit unspoken irritation. His abrupt answer appeared to be a direct result from reminiscing about a past group learning experience that he had found less than pleasant. Master D explained that his preference of working individually stemmed from his desire to just 'get on with his work' and to not have to be accountable to another peer, especially when there was a conflict of ideas or answers.

Four of the eleven participants interviewed, observed themselves as learning more when they worked as part of a pair, three of whom were treatment group participants. The general consensus from participants was that they were of the belief that they learnt more when working as part of a pair, as it allowed them to assess with their peer, if they were on the right track with their answers, and helped them to gauge their understanding of what the learning activities required from them. The participants also valued the discussion that could develop from working alongside a peer, without the possible distraction that they had at times, experienced when required to work and/or discuss items as part of a group. Miss C expressed her belief that she learns more when she is able to work as part of a pair as she is a 'people person' who doesn't like to be alone. However, it is unclear to the researcher what Miss C was implying when she expressed her reluctance to 'being alone' and due to time restraints, the interviewer did not ask Miss C to elaborate on this for clarification.

Interestingly, the three participants who were of the understanding that they learnt more when part of a small group, were all treatment group participants. Two participants, Miss A and Master K were both enthusiastic and absolute commenting that for them it was more 'fun' to work within a small group

environment, either because they had the opportunity to learn from others or because they were able to collaborate together to get more work done. It appeared that unlike Master J, the three treatment participants were able to reminisce about positive small group learning experiences and held value to these during the time of being interviewed.

5.4.3 Teacher Influence

As discussed earlier on in the chapter, the reading unit was designed by both the researcher and the teachers implementing the programme within the scope of the study. Time restraints on the researcher did not allow for her to interview the teachers involved within the study, however general discussion provided a casual understanding of the underlying pedagogy both teachers had towards teaching reading, which in turn, effected the way in which they taught and facilitated the implementation of the reading unit within the study. Teacher A, who facilitated and implemented the reading programme to the control group participants tended to instruct and encourage his students to read and work independently throughout the duration of the unit. Students were allowed to work alongside each-other, however individual copies of work were required in each of their workbooks.

Teacher B who facilitated and implemented the reading programme to the treatment group had a vastly different philosophical approach to the programme. Throughout the reading unit, while students were required like those of the control participants, to complete and have evidence of their own work, the learning activities were often undertaken in pairs or small group environments, allowing the students to share their ideas and thoughts throughout the completion of the learning activities. Often the use of iPads also allowed for the students from the treatment group to present their completed work to the class via Apple TV which Teacher B noticed for most part the students relished in exhibiting and celebrating their work amongst their fellow students and the rich classroom discussions that would ensue from these collaborations and presentations.

Though not proven, it is possible that the environment and the teacher approach in which the participants were required to complete the reading unit in, affected the perceptions from the participants of the environment in which they see themselves learning best in.

5.5 Summary

The interviews conducted as part of the qualitative phase of the mixed methods research project indeed provided a richer and in-depth understanding of the perception held by the participants in regards to their levels of engagement and learning in reading. These findings have revealed the extent to which engagement is understood and defined by the middle school participants interviewed, as well as their perceptions around how they learn best from executing the prescribed activities, to their social learning environment. The next chapter analyses the research findings with reference to previously presented academic literature and in the closing chapter, presents recommendations that may guide educators who are currently, or looking to implement iPads into their reading programme.

Chapter Six: Discussion

6.1 Introduction

The purpose of this small-scale experimental/exploratory, mixed methods research project was to investigate the influence iPads had on reading achievement in middle school students, as well as explores the perceived learning and engagement levels of the students, in order to ascertain if the current use of iPad technology within a reading programme diversified such levels. The previous two chapters highlighted through quantitative data the disparity between the influence of iPads on reading achievement, compared with that of traditional text and written work, as well as the qualitative data exposing the diverse perceptions amongst students as to how they believe they learn best and their rudimentary knowledge of engagement in learning. This chapter validates the empirical data with academic rationale, and is discussed and presented within the four themes that were apparent during the analysis of the data: Reasoning and rationale for the influence iPads had on reading achievement, implications of incorporating technology into reading programmes for educators, the importance of engagement for learning and collaborating verses cooperating for student learner benefits. Recommendations, limitations and strategies for educators are offered in the next chapter.

6.2 Addressing the Hypothesis

As previously addressed in Chapter three, the quantitative data was primarily used to make conclusions of the hypothetico deductive mode in the form of a *null hypothesis* (H_0). While a casual hypothesis (Wright, 2003) would suggest that iPads do influence student reading achievement, the choice of adopting such a strong hypothesis in that of the *null hypothesis* required the researcher to produce rigorous statistical evidence not to support it (Cohen et al., (2011). However, in the case of this study, the *null hypothesis*, of 'no relationship between iPads (variable) when used as an e-reader and application and that of students reading achievement (variable)' was supported by the statistical t-test

analysis calculated by the mean scores of the two comparison groups of participants' *comprehension, accuracy* and *rate* in their pre and post-test, as well as the comparison the two factors of pre and post-test between the two groups independently. While independent analysis of both groups of participants pre and post-tests displayed an increase in achievement scores in all three aspects of the reading achievement test (*comprehension, accuracy* and *rate)* and as such, be pleasing for educators at first glance, these results did not produce a rank correlation which would predict further certainty in such results being replicated for future tests. When mean scores for *comprehension, accuracy* and *rate* were analysed from the pre and post-tests for the participants who used iPads throughout the duration of the study, the increase (and decrease) in scores between each test did not fall within the 5% level of statistical significance set by the researcher, thus supporting the *null hypothesis* (H_0) that the increase or decrease in reading achievement scores from participants who used iPads as an e-reader and application in their reading programme for the duration of the 5-week study were not statistically significant therefore did not influence their reading achievement.

6.2.1 The influence of iPad as an e-reader to students' reading achievement

The culmination of the findings from this 5-week study suggests despite all intentions, through the evidential empirical data obtained via quantitative, standardised testing measures and subsequent analysis, the overall conclusion from the findings is that iPads when used as an e-reader and application do not influence students reading achievement in the form of comprehension, accuracy and rate. Whilst at first glance, assumptions could be made through analysis that students who did not employ and/or have access to iPads throughout the study, improved more in their overall reading achievement compared with those who used iPads, however, such improvements were not great enough to be of any statistical significance. This is also evident in the decrease in reading

comprehension average scores for treatment participants. Initially such revelations from analysis could cause concern, yet once again the decrease in comprehension scores was minimal and ostensibly equated to not having any statistical significance. The positive monotonic relationship correlation between the pre and post-test results indicated that there were steady improvements made overall, from both the control and treatment group participants in all three areas of reading achievement, however as both groups improved, it can be suggested that the influencing factor or factors causing the improvement were from another variable, possibly in the form of the novel used throughout the study, the teachers influence, student environment and so forth.

It is clear from the statistical findings that students' achievement in the form of comprehension, accuracy and rate was not impacted either negatively or positively by the iPad when compared with that of traditional paper based text. This finding is supported by contemporary research studies exploring iPad influence in terms of increasing in student achievement (Baker, Gearhart, and Herman, 1994; Carr, 2012; Connell, Bayliss & Farmer, 2012; Dundar & Akcayir, 2012; Milone, 2011). However, although the findings from this research presented no significant difference in reading comprehension, accuracy and rate while reading using e-books on the iPad compared to paperback books, this does not suggest that iPads and their e-reader application iBooks, should be disregarded in 21st Century classrooms. As cited in chapter 2, perhaps it is more beneficial to investigate how iPads support teaching and learning in ways which would otherwise not be possible (Murray & Olcese, 2011) and the value the device has for education especially from the perceptions of students who ultimately are faced with using such devices to support their learning in the future.

6.2.2 Rationalizing the influence

As outlined earlier in the chapter, the results from the quantitative statistical analysis findings of this study are in line with that of previous research and as such, may not evoke much confidence in educators and parents to implement

and invest in iPads as a e-reader and learning tool to support reading achievement. However, the important word 'tool' used to describe iPads within the educational setting does not define the device as an omnipotent, answer-to-all-learning-achievement woes, one-device-solves-all-problems solution. Whilst research reports can be expeditious in focusing on technology's inability to reform achievement within schools (see OECD, 2015), it is vital that consideration for schools and educators to implement iPads in classrooms is of the understanding that the device itself is simply… a device, like that of the desktop computer and laptop computer that came before the iPad. The level of effectiveness of the iPad in educational technology is influenced not by the device itself in solitary, but as a factor amongst other influences such as the software used, the educators' role and the level of student access to the iPad itself in the classroom (Sivin-Kachala, 1998). Although the findings from this research do not favour iPads as a e-reader and application to improve reading achievement, Schacter's (1999) review of over 700 empirical research studies (e.g., Harold Wenglinsky, 1998; Sivin-Kachala, 1998;) in a national sample of fourth and eighth grade students, and in an analysis of newer educational technologies found that students with access to integrated learning technology showed positive gains in achievement on researcher constructed tests, standardized tests, and national tests. Due to the large scale data findings from the studies reviewed by Schacter (1999), questions arise into the almost certain factors which may have influenced this research in producing the *null hypothesis* such as the limited length of the study, the small scale population and restricted set learning activities.

6.3 Utilizing iPads as e-readers to support learning in reading

There are many factors that educators need to consider before implementing iPads into the education system. Further discussion could be undertaken around the almost endless learning apps both students and teachers alike could adopt as tools to support their learning and teaching. However, the focus of this section is around the iPads ability to be used as an e-reader. Also, the implications this has

for both teachers and students in the classroom as reading devices have the potential to be the reading instruments of the future. While the findings of the research conclude that e-readers on the iPad do not hinder student comprehension, educators need to evaluate if such readers are beneficial, particularly in a BYOD classroom. Researchers acknowledge that the advantages of an e-reader over other reading technologies are encouraging due to the features of portability, legibility of text, storage capacity, long battery life, and wireless connectivity (Thayer et al., 2011). Attributes of e-readers that make them more appealing for educators are they are more cost effective (Stephens, 2012), used as a resource to teach reading and research skills (Barron, 2011; Larsen, 2010) can adopt a text-to-speak function- applicable for students with dyslexia, reading challenges or visual impairments (Ludlow 2010; Shah 2011) and have the ability to engage students using media types that they are accustomed to and favour (Brown, 2012; Robinson and Stubberud, 2012).

6.3.1 Student preference of reading tool

Whilst the influence from iPads was neither positive nor negative to student reading achievement, educators may wish to investigate other beneficial factors that iPads have before investing time, money and effort to implement the devices for their electronic- reader compatibility and applications. An overwhelming number of participants (82%) who used iPads as e-readers for the duration of this study would recommend them to others based on their perceptions that the devices as e-readers were easier to read from and enjoyed the additional features iPads as an e-reader employ, such as the dictionary feature, the ability for the device to pronounce to them unknown text and the selection of font size and type to suit personal reading preferences. Consequently, it is this feature e-readers encompass which allows the reader to change the font style and size which the participants of this study acknowledged as one of the features which added to improving their reading experience. Such findings are in line with that of Connell et al., (2014) and Kiriakova, Okamoto, Zubarev & Gross (2010). The use of technology with struggling readers has been

investigated by researchers for decades (Horney & Anderson-Inman, 1999; Horton, Lovitt, Givens, & Nelson, 1989; Smith & Okolo, 2010) with varying degrees of effectiveness (Balajthy, 2007; Hasselbring & Goin, 2004; McClanahan et al., 2012). Digital technology is becoming prevalent and is appealing to today's youth. This alongside the features that the iPad encompasses in order to support and aide the reader with the text, may assist in increasing student's motivation to read more (Maynard, 2010; Strout, 2010) especially when the features highlighted above can assist in accommodating students who struggle independently when reading difficult text. This feature in itself is implored by Larson as possibly being the most worthwhile reason why students in schools should be allowed and encouraged to use e-readers with electronic text (Larson, 2009; Larson, 2010).

6.3.2 Implications for Educators

The notion of immersing students in interactive, portable and accessible literature is enticing for many an educator. This alongside the many favourable features e-readers embody has seen numerous educators employ e-readers in their institutions. While the findings from this research suggest that reading achievement in the form of comprehension, accuracy and rate is not influenced by the use of e-readers, educators need to investigate further, the affordances and constraints e-readers have as an influence on students learning (Hutchinson, Beschorner & Schmidt-Crawford, 2012). It is certainly in the best interests of this researcher and primarily those in a similar position as educators, to ensure that thorough investigation is undertaken not only into the influence iPads have on student's reading, but also in the skills and strategies that must be adopted by the teacher and learner alike to read and navigate the iPad (as an e-reader) itself. According to Coiro, Knobel, Lankshear, and Leu (2008) digital texts often require different skills, modus and strategies compared with that of printed text (Leu, Kinzer, Coiro, & Cammack, 2004; Lankshear & Knobel, 2004) and due to students being exposed to multi-model texts on a daily basis, there is the need for them to

be able to break the code, make meaning, use and analyse such texts (McDowall, 2010, p.61).

It is almost certain that due to the accelerated sales and growing demand (e.g., Bosman, 2011; Bloomberg News, 2011; Molchanov & Howe, 2011; Woodward, 2011) e-books and e-readers are here to stay and will lead to further innovations in reading, as well as a wider acceptance of their use (Doiron, 2011). As such, it can be assumed that the technology of e-readers is one in which is referred by the Ministry of Education (2013) who set the expectation for educators to implement learning opportunities which familiarize students with this digital technology and allowing them to develop the new reading skills and strategies needed to prosper throughout their educational journey and beyond. However, it is important for educators to consider that this is not simply a dictated instruction and expectation by the Ministry of Education, but rather, due to the transactional relationship between literacy and technology (Leu, Kinzer, Coiro & Cammack, 2004) teachers themselves need to understand that the skills and strategies mentioned earlier in this section are required when students encounter the plethora of new literacies in the form of digital text and online collaborative communication. Consequently, teachers are and will continue to be challenged to transform reading instruction in response to the evolving digital technology (Larsen, 2012).

While e-readers as a 'tool' can be viewed as a vital part of reading instruction for the future and provide opportunities for students to learn and develop reading skills and strategies using pathways that have not been possible previously, the effectiveness of their use requires both technical knowledge and a disposition for growth and flexibility from educators when planning and conducting lessons accordingly (McDowall, 2010). The role of professional development for teachers in order to effectively teach the required skills and strategies to their students and provide ample learning opportunities using e-readers in their reading programme is suggested in the conclusion chapter of this thesis.

6.4 The Importance of Engagement- An interpretation & clarification of the findings

Engagement is a concept that is widely recognised in educational research and in academic literature (Akey, 2006; Fredricks, Blumenfeld & Paris, 2004; Shin, Daly & Vera, 2007; Zepke et al., 2014). However, definition and terminology of engagement often differs, making comparisons between models and types of engagement difficult (see Appleton, Christenson, Kim & Reschly, 2008; Libbey, 2004; Rumberger & Lim, 2008). For the purpose of the discussion within this chapter, certain components of engagement are based upon that of which is outlined by Finn and Zimmer (2012) and include concepts of *Academic, Social, Cognitive* and *Affective* engagement p.104.

6.4.1 Examining Motivation

Motivation is a construct which describes what compels learners to invest time and effort into their learning activities (Gibbs & Poskett, 2010, p.17) and can be further defined as the conditions and processes that account for the awakening, direction, significance and preservation of achievement (Katzell & Thompson, 1990, p.144). The findings from this research clearly show that the introduction and utilization of iPads into the 5-week reading unit did not actively influence the student's motivational levels to their learning when compared with that of their peers who participated in the unit using printed text and written activities. Academic literature into the motivation of academic learning for middle school students suggests that the instructional practises of the teacher (amongst other factors) can have an adverse effect on students of this age's motivation levels (Dembo & Eaton, 2000). Therefore, the findings around motivation of the students who participated in the reading unit for this study, indicate that the high levels of motivation cannot be feigned to be from the iPad itself and could be assumed to be a conglomeration of other factors such as teacher instruction and their relationship with the students as well as the learning environment the

students were exposed to. An exploration of these factors which may have influenced the student's motivation throughout the unit would be beneficial and could be an incentive for future research.

6.4.2 Parsing Participation

Engagement is a multi-dimensional construct- one which not only requires teachers to understand influential factors within the affective connecting of the environment, but also in student behaviour in the form or participation (Appleton, Christenson & Furlong, 2008; Newmann, Wehlage & Lamborn, 1992). While the findings around motivation were similar from both groups of students, when it came to participation there was variance within the data. Participation is described in academic literature as both a productive work habit, likely to contribute to learning, as well as evidence of student motivation to learn (Turner & Patrick, 2004). The findings showed that a very high number of students who used iPads believed they participated more during the reading unit, compared with that of the students who did not use iPads. The findings from the interviews supported this participation perception as there was general consensus from those who used iPads enjoying the ability to use their iPads and participate "*as part of a pair or group*" collaboratively and as part of a sharing (of information) environment. Perceptions around participation for students who did not use iPads was admittedly still quite high (although not as high as the iPad students) however, there was also a higher degree of uncertainty from the students who used printed text and completed the activities using an exercise books, as to whether they participated more during the reading unit compared with previous reading units. It was noted through the interviews that students who completed the reading activities in their exercise books did not like to participate in activities that required *"heaps and heaps of writing"* and preferred activities that allowed them to design and draw. Academic literature supports the role technology has when incorporated alongside informal learning experiences, in fostering active participation and engagement of students. (Boyce et al., 2014;

Dunleavy et al. 2009) and accordingly, research has found that when technology is incorporated within learning experiences, students are able to later reflect on their experiences at home and at school (Anderson et al., 2000; Zimmerman & Land 2014), thus providing an opportunity to blur the lines between home and school digital engagement (Gurung & Rutledge, 2014).

6.4.3 Evaluating Student Perceptions of Engagement

As outlined in Chapter two, there are many definitions of engagement, as well as perspectives held as to its various constructs and dimensions. For the purpose of this study, the definition of engagement was adopted by the researcher, from Akey (2006) who states:

"Student engagement can be defined as the level of participation and intrinsic interest that a student shows. Engagement in schoolwork involves both behaviours as persistence, effort, attention and attitudes (such as motivation, enthusiasm, interest and pride in success)." p.3

Yet, while such a definition is coherent for the researcher, careful consideration and questioning had to be undertaken in order to gain knowledge around the student's understanding of engagement and how they incorporate the importance of its meaning (Sayer, 2000). It was vital for the researcher to collate not only quantitative data which measured the students' opinions and feelings around different forms of engagement, but qualitative data was needed in order to delve deeper into the student's understanding in the form of perceptions of what they were rating their opinions and feelings on. Certainly the qualitative data analysis clarified and assisted in justifying the opinions and feelings within the survey by exploring the participant's views in more profound depth (Creswell, 2003; Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998) as the researcher endeavoured to accept the student's valid perceptions of engagement and sought to understand it from their point of view (Maxwell & Mittapalli, 2010).

Findings from the qualitative data analysis indicated that the students held a common perception of engagement, defining it as being 'focused' and in 'exhibiting interest' in the classroom activities. This is in accordance to comments the students made when queried as to what it means to be engaged in a class environment such as "*Being focused and absorbed in whatever you are doing"* as well as "*Getting it done, being interested and talking about the book".* The researcher believes this definition sanctioned from the comments, provided the foundation of the students' understanding of what they perceived engagement to be. Fundamentally, this provided further clarity into the types of responses analysed from both sets of students during the data analysis obtained from the survey question 'I remained focused and attentive when completing the activities'.

As 'focused' and 'interested' were the common factors the students connected with engagement, then criticism and inquiry is raised by the researcher as to whether or not rephrasing the question from 'focused' and 'attentive' to engagement, would have yielded similar results. Consequently, analysis from the posed question provided stark contrasts between the two groups of students. The findings show that just over half of the students (52%) who read the printed text and completed the activities in workbooks, were of the belief that they remained focused and attentive during the unit, while just under a third (31%) were unsure. While these findings may be pleasing for some teachers, they are somewhat austere compared with the results from the students who used iPads, most of whom were of the belief that they remained focused and attentive throughout the unit (82%). Admittedly, a small percentage of the students (6%) who used iPads did not believe they remained focused and attentive during the unit, however it would be bigotry for the researcher to primarily isolate the iPad as the factor for the students' perceived lack of focus and attentiveness and not consider other outlying factors. Such findings around student perceived engagement with iPad use contribute and support existing academic literature (see Clark & Lukin, 2013; Diemer et al., 2013; Günüc & Kuzu, 2014; Mango, 2015; Mo, 2011) providing fulcrum that the integration of digital technology enhances

student perceived learning engagement and as such, has the potential of improving student performance.

6.4.4 Interpreting Perceptions of Learning

School students in today's 21st century learning environments can be considered 'digital learners' as "technology is as persuasive in their academic world as in their personal lives" Gurung and Rutledge (2014, p.91). At the heart of these students'- identified as 'Digital Natives' (Prensky, 2010) discourse is their personal use, inherent digital skills and penchant for using technology, which can be utilized to construct meaningful learning engagement inside the disparate classroom settings (Palfrey & Gasser, 2010; Prensky, 2010). Research that improves the design of instruction needs good measures of student engagement to evaluate the efficacy of instructional interventions and is an important endeavour in determining how to best use people and technology to engage learners in meaningful and effective learning experiences (Henrie, Halverson & Graham, 2015, p.37). The findings clearly show that a high number of students who used iPads for the duration of the study postulated the iPad, when used as a tool to complete the accompanying reading activities to the novel, assisted in helping their learning. Coincidently, a similar number of students also gave acclamation to the iPad as furtherance, for helping them to connect ideas in new ways. The findings from the interviews endorse the survey findings as the students who used iPads to complete the reading activities contend the importance of the activities in order to understand the novel more and to engage in deeper thinking in order to complete them.

Whilst many a student who did not use an iPad still found favour with the reading activities in helping them to support their learning and connect ideas in new ways, the findings from the interviews indicate that just under half of them were unsure or did not believe the activities assisted in their learning. Interview findings suggest that these beliefs were founded on the students' understanding

that the activities were simply a form of revision of the story line rather than assisting in their comprehension.

Research on student perceptions of learning and engagement have traditionally been used for gauging the success of new instructional technology (Alavi, 1994) and as such, there is a surfeit of academic literature around the cognitive indicators of student's perceptions to the value of their learning (see Appleton et al., 2006; Appleton et al., 2008; Fredricks et al., 2004; Finn 2006) outlining the importance of student perspective as an essential element for change in student learning and behaviour (Christenson, Reschly & Whylie 2012). This study's findings around instructional digital technology and student learning perceptions agnate with that of Akyol and Garrison (2011) as well as Diemer et al., (2012) although, the results from this study did not assess and therefore, reflect the positive learning outcomes like that which accompanied Akyol and Garrison (2011) and Diemer et al., (2012) work. The researcher acknowledges that further research could be conducted through quantitative assessment which explores the direct relationship between the academic learning outcomes and that of the instructional learning with iPads.

6.5 Social Collaboration vs. Academic Co-operation

The findings from the qualitative data analysis not only provided a more in-depth understanding into the students' knowledge of what engagement meant to them, such data also provided the catalyst for greater apperception into what the students perceived engagement to 'look' like in a reading classroom environment. As noted in the qualitative result analysis in chapter five, perceptions and understandings of what engagement 'looked' like within a reading classroom differed amongst the two groups of participants. Students who used iPads within the study were more inclined to indicate examples of social engagement referring to the extent in which they interacted with their peers and participated within part of a group setting. For instance, a student,

identified as Miss A, established her understanding that engagement looked like a student *"being involved and learning with other people and talking about different ideas and getting involved"*. Similar views and comments were also expressed by others within the group who added inferences of '*team work*' and '*helping each other*' to their knowledge and understanding of what engagement looked like to them. Such perceptions may have been formed through the collaborative nature that iPads were and are able to encompass as a digital technology.

Findings from the qualitative analysis of the student responses of whom were in the control group tend to support this, as their perceptions of what engagement 'looked' like were different from those students who did not use iPads. Such perceptions held by the students who completed their activities using pencil and paper, tended to focus around the concept of academic engagement, with a general theme amongst the group interview responses being one of *diligence* towards their work and *interest* in completing the set activities. These themes from the student responses concur with that of academic engagement as the behaviour relates directly to the learning process (Finn & Zimmer, 2012) and contradict that of the social engagement perceptions relayed by the students whom used iPads.

6.5.1 iPad Collaboration

For the students who used iPads in the reading unit adopted within the study, the reading activities allowed and encouraged students to create, discuss and share ideas and concepts through the selected applications afforded by the iPad. As such, the social engagement identified by the students could be attributed to the students' interactions with each other within a collaborative learning environment which is at the heart of collaborative learning, rather than learning itself being a solitary activity (Prince, 2004, p.223). Classrooms are inherently social places and as such, students pursue both social and academic goals in the classroom (Juvonen & Murdock, 1995; Ryan & Patrick, 2001; Urdan & Maehr,

1995). However, whilst Finn and Zimmer (2012) acknowledge that there needs to be a certain level of academic engagement in order for learning to occur, this can be hindered by a low degree of social engagement. With relevance to this study, the students who did not use iPads, perceived engagement in the reading class to be from an academic dimension, possibly due to the minimal social interaction and collaboration required by the set reading activities. Consequently, the same group of students expressed a greater level of uncertainty around the reading activities role in assisting them with their learning compared with those students who used iPads. While the findings from this study did not specifically measure student engagement against that of achievement, there is much academic literature (e.g., Gurtner, Monnard & Genoud, 2001; Salonen et al., 2005; Salili, 1996) exhibiting supporting evidence around the impact meaningful social collaborative contexts in learning have on individual student motivation and engagement.

As observed within the findings of this study, the iPad was able to be utilized by a group of students during their reading unit, as a tool to facilitate collaborative learning groups, which could also be seen as a social system of students. These various 'social systems' of students whilst working collaboratively, were engaged in meaningful reading activities (based upon their perceptions) and subconsciously deployed appropriate social engagement processes in order to regulate their interactions towards the completion of the activity, inherently, a form of academic engagement (Järvelä, Volet & Järvenoja, 2010).

6.6 Summary

The research findings and discussion raised in-depth questions around the value iPads have within the educational classroom setting. Although questions may arise regarding the iPads' minimal direct influence to student achievement in reading, certain engagement factors developed through the collaborative learning environment iPads are able to adopt, must be taken into consideration. The discussion dictates that focus should not be on the iPad as a direct effect to student achievement, rather, schools must acknowledge that as a digital device,

iPads have the ability to promote engagement and develop social collaborative interactions which research has shown as being a strong foundation for learning and student achievement. This chapter has provided an examination into the influence iPads have as an e-reader and application to students' reading achievement, as well as investigating the learning and engagement perceptions of the students. It also identified the various dimensions of engagement and supported the findings of the investigation with evidence provided by other researchers. Recommendations of iPad adoption and facilitation to support student engagement and learning in reading, as well as a means for addressing this challenge for teachers is provided in the concluding chapter of this thesis alongside the limitations of the study and recommendations for future research.

Chapter Seven: Conclusion

7.1 Introduction

Schools and teachers alike are faced with facilitating the learning needs of students who often, are part of a digitally different society due to the nature of their technological environmental upbringing. This is alongside the challenge of accommodating new digital devices and adapting the current curriculum programmes in order to enhance teaching and learning for the students through educational pathways that enhance engagement and achievement outcomes. This is of particular importance for teachers of middle-school students as often it is during this stage of their schooling that young adolescents begin to doubt their ability to succeed in their schoolwork and question its importance, marking the beginning of a downward trend in their academic and engagement levels (Anderman & Maehr, 1994; Ryan & Patrick, 2001; Walker & Greene, 2009). The purpose of this chapter is to make concluding remarks about the findings with reference to the future of reading instruction for the researcher as a teacher, and present recommendations for teachers to implement iPads into pedagogically sound teaching and learning classrooms that promote student engagement in reading through collaboration. The limitations of the research and recommendations for further researcher are also discussed.

7.2 Facilitating iPads to support 21st Century Middle-School Student Learners in Reading

Reading is a fundamental skill incorporated into all other learning areas and is frequently utilized through life (Burnside & Muilenburg, 2012). Unfortunately, for many students, reading is not a skill which comes easily. As such, many middle-school students who struggle with reading and can be considered low achievers in this area, tend to disengage and disconnect from various presented reading content (Guthrie & Davis, 2003). According to the findings from this research and in conjunction with other academic literature (e.g., Carr, 2012; Dundar & Akcayir,

2012) iPads as a digital device, due to their direct minimal influence on reading achievement, cannot be assumed to be the panacea to the current problematic reading achievement issues facing many middle-school students and teachers in our New Zealand Schools. Such findings parallel that of previous academic literature (see Becker, Ravitz & Wong. 1999; Cuban & Kirkpatrick, 1998) which in investigating various forms of technology within an educational setting, purports technology's unfulfilling role as the independent variable to increase student achievement.

However, this researcher suggests that iPads, as the newest form of digital technology, should not be viewed in such a narrow, deterministic manner. IPads, like that of previous technology and digital teaching resources, should be viewed for what they are- a teaching and learning tool. A tool which offers assistance for teachers to support readers with reading content through its various features as an e-reader, including dictation, a dictionary and the ability for readers to permute size and type of text fonts. The same reading 'tool' which provides users with the ability to access text with ease any time and place and with the ability to foster engagement and collaborative learning in order to increase student motivation and outcomes (Benton, 2012; Crichton, Pegler & White, 2012).

The findings from this study indicate that the middle-school students who used iPads as part of their 5-week reading programme were of the belief that they were more focused and attentive during the reading unit which incorporated iPads, compared with previous reading unit which did not. Similarly, many of the middle-school students attributed the words 'focus' and 'interested' as being defining words when explaining the definition of engagement. Further insight into what engagement looked like to the students who used iPads revealed that their perceptions of engagement were based around working socially and collaboratively with and alongside their peers. Students are more actively engaged when learning is perceived to be fun (Brown et al., 1989) and as such, social engagement can be enhanced through the iPads ability to accommodate collaborative learning opportunities through its wide variety of applications

whose designs can initiate conversations between students. This provides opportunities for students to engage with others in substantive conversation, linking the classroom world with that of the outside world and in turn, enables students to be intellectually challenged in a meaningful and supportive environment (Gibbs & Poskett, 2010). The multimedia and visual features of the iPad also assist in making reading activities more relevant and meaningful for the students who along with social interaction require frequent stimuli to keep them engaged throughout the learning process (Alison & Rehm, 2007).

7.2.1 Evaluating the engagement inquiry

One of the three inquires that provided the foundation for the central research questions was 'Does the exposure of iPads within the reading unit, engage the students more?' Through analysing the perceptions of the students who used iPads, alongside inferencing the supporting interview responses, the findings suggest that from the students who used iPads perspective, that yes, the utilization of iPads within the reading unit did enhance their engagement compared with that of previous reading units, with the understanding that engagement was a social dynamic around working collaboratively with others. Such findings support that of Juvonen and Murdock (1995) as well as Urdan and Maehr (1995) who concur that students pursue both social and academic goals in the classroom. The findings are also in line with research (see Mango, 2015; Wang & Holcombe, 2010) which documents the impact social classroom environments have on student motivation and engagement.

Such focus around social engagement through collaboration in reading is vital, as often middle-school students who are low achievers in reading feel socially marginalized and lack a sense of belonging. Subsequently, this can diminish self-esteem creating a downward spiral of lower cognitive competence, intrinsic motivation and self-efficiency, providing further disengagement from reading (Anderman & Anderman, 1999). However, there is also a substantial body of empirical evidence (e.g., Nichols & Miller, 1994) that supports the sentiment that social context and collaborative learning has an impact on individuals' motivation

to engage in learning activities (Järvelä et al., 2010). Consequently, the iPad as an interactive tool has the ability to accommodate and enhance collaborative learning through its stimulating, interactive multi-media and multi-touch features (Hourcade, Beitler, Cormenzana & Flores, 2008). This alongside its portability assists in the development and enhancement of social environments according to the social constructive perspective, understanding that students when interacting together, exert an influence on students' motivation and engagement (Järvelä et al., 2010).

7.2.3 Diminishing the Digital Divide

While the iPad as a tool provides affordances for readers as both individual learners and as part of a group in ways which were previously unattainable, it is imperative that educators (and educational institutions) comprehend that it is themselves at the head and the heart of the classroom which ultimately dictates the effectiveness of the iPad as a tool in the classroom and for the students who use them. Given the Ministry of Education's influence in the form of its *Statement of Intent* encouraging teachers to adopt digital tools due to the potential they have to accelerate and transform the sharing of knowledge and development of skills to enhance and engage 21st century learners (Ministry of Education, 2013) questions arise as to the professional development needs of the teachers at the forefront of the iPad implementation.

In the rapidly changing world of digital technology, teachers wishing to adopt iPads into their classes must have time to evaluate and mediate their own professional learning needs (Kearney & Maehr, 2013) exploring both the informal and formal ways in which to engage their students (Hargis, Cavanaugh, Kamali & Soto, 2013) and providing opportunities for critical reflection throughout the journey (Keanrney, Burden & Rai, 2015). Thus, if teachers are to strive to implement different approaches to teaching and learning and through these new approaches simultaneously accommodate the change in relationship

between the teacher and students, then it is essential to understand teachers' learning and the role the iPad may play in this (Fisher et al., 2006). Accordingly, in order for teachers and educators to create the optimal pedagogical impact from iPads, there must be the requirement of innovative pedagogical design and support from the school, so that teachers are confident in trying new ways to integrate iPads within their socially collaborative and constructivist learning environments (Cochrane et al., 2013).

7.2.4 Personal Practice Reflections

The purpose of this study was to explore the influence iPads had on middle-school students' achievement and perceived learning and engagement in reading. Literature, alongside the findings from this research tell us that technology as an independent variable, does not influence student achievement. However, the researcher acknowledges for her own teaching practice, this is not a resolute argument to dispel incorporating new technologies into the classroom. Academic literature provides much evidence around the influence student engagement has on academic achievement (see Guthrie & Davis, 2003; Ryan & Patrick, 2001). For the researcher, the findings from this research and supporting literature, has provided insight, knowledge and further understanding as to the type of pedagogical learning environments that adopt digital devices and consequently, utilize the devices to provoke more dynamic lessons, enhancing student engagement, which in turn according to literature, influence achievement.

The researcher acknowledges that the findings from this research has influenced the way in which she will design and implement reading instruction to her middle-school students in the future. The researcher seeks to apply new knowledge and understanding to her pedagogical teaching practice, applying the modern technology of iPads as a tool, to interact and teach the sharing of knowledge and reading skills though the encouragement of collaboration and social interaction amongst her students, with the purpose of fostering student engagement and motivation in reading.

7.3 Limitations of the study

There are a variety of limitations that may have affected the overall findings of the study. Firstly, this was a small-scale research involving a total of 45 students and two teachers from one middle-school. Due to this limited scope, generalisations cannot be drawn. The limited time frame and resources also dictated the methodology and the amount of data that was able to be collected. Although the nature of the mixed-methods design was to enrich the survey responses through interview descriptions, the limited time frame governed the use of one-off group interviews, which inadvertently collected data from a glimpse of experience, rather than drawing inference of respondent knowledge and proficiency over the 5-week time frame.

Consideration must be given to the iPad as a modern technological device and the possibility that the self-reported nature of the participants' perceptions around their learning and engagement, may be influenced and attributed unwittingly to the device itself, due to the hype surrounding its recent inauguration. The duration of the 5-week study may also be identified as a limitation and possible explanation to the iPad intervention not having a statistically significant impact on students' reading achievement, particularly when technology may need to be implemented for up to eight years in order for an identifiable effect to be observed (Silvernail & Gritter, 2004).

The researcher herself acknowledges her part as a limitation to the study. The interpretive nature of the interviews were subject to interpretation by the researcher, subjective to her own knowledge and understanding provided by her own sense of 'reality'. Whilst care has been taken by the researcher when attempting to interpret the qualitative findings the researchers' personal 'reality' and perspective could have limited the analysis and comprehension of the students shared knowledge and experiences as they were originally intended.

As highlighted in chapter 3, the mixed-methods methodology is also not warranted against limitations. Earlier discussion emphasised the issues that trouble the mixed-methods research design, particularly, that in which can arise when the researcher attempts to 'merge' the quantitative and qualitative databases together, rather than using the qualitative data to explain the quantitative data more in-depth. As such, a form of limitation exists as the researcher may attempt to merge the datasets in order to elaborate on the findings of the study , unwittingly overseeing the original intention the data, conforming it to explain findings it is not intended for.

Finally, a limitation needs to be recognized in the form of the two participant teachers, who may have unintentionally affected the data. However, due to the study encompassing two teachers- one for the control group and one for the treatment group, it would be impossible to determine the effectiveness of the teachers which may have attributed to the lack of significant findings (Carr, 2012) yet, must still be acknowledged as a possible limitation to the study.

7.4 Recommendations

This study offers a small contribution to the limited understanding of the influence iPads have on middle-school students reading achievement and perceived learning and engagement levels. The scope of the research needs to be broadened to accommodate a variety of New Zealand middle-school students and the representative demographics they embody, as well as a more comprehensive longitudinal exploration in order to effectively evaluate iPads as a technology's influence on student achievement. It may be possible for future studies to replicate this research on a broader scale with various student populations, admittedly providing a basis for generalisation (Creswell, 2002). A more in-depth study into the influence iPads have on the various individual dimensions of engagement may be valuable for educators as well as investigating the influence iPads have on student engagement levels over time.

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Appendix

Appendix A: Principal and Teacher Information Letter

INFORMATION LETTER REGARDING INTENDED READING COMPREHENSION RESEARCH

Dear *(names of Principal & Teachers)*,

Further to my meeting with you all, this is a formal request to undertake the study on iPads and reading comprehension as described, in *(name)* and (name) reading class. During a recent Year 7 team meeting it was agreed upon by the Year 7 teachers that *(name)* would head the experimental reading group which incorporates iPads, due to her knowledge, experience and expertise in teaching a blended learning class, while *(name)* would head the control reading group. Both teachers have welcomed the opportunity to be involved in the study.

It is acknowledged that informed consent will be obtained from the participants and their parents/guardians before the study is initiated. This research project has been approved by the University of Waikato's Faculty of Education Ethics Committee and will be conducted under the supervision of Senior Lecturer Dr Nigel Calder. Data gathering will take place in the early weeks of term 2, and will explore the possible influence iPads have on student achievement and perceived learning and engagement in reading (specifically comprehension). I endeavour to undertake one-on-one reading pre-tests with all student participants involved. Following this both classes will commence in a set reading programme formally designed by *(teachers names)* and myself. Both classes will encounter the same text, with the experimental reading group using their iPads as an e-reader and participating in comprehension activities using supporting applications. The control group participants will use print based novel as their text and will not use iPads or any other form of technology in the reading comprehension activities they engage in. It is understood that the study will commence in week 4 and continue for 5 weeks, concluding at the end of term 2, whereby the participants will again be tested using a similar format to the pre-test. The data obtained through the participants' pre-test and post-tests will then be analysed by me for evidence of the possible influence iPads may have, on students reading achievement.

I also wish to survey participants and interview selected groups of students, where they will be invited to exhibit their views and understanding (through the survey) and express their opinions (through the interview) of how they identified with their learning and engagement throughout the reading unit. Data from both the survey and interview will be grouped into categories based on the specified content from the questions, which will provide perceived learning and perceived

engagement variables to analyse. It is expected that both the survey and the interviews will take no more than 30 minutes each to complete.

As the researcher, I will strongly endeavour to maintain the participant's confidentiality throughout the research but cannot guarantee complete confidentiality.

The research project will primarily be used to write a thesis for a Master of Education degree at the University of Waikato. However, it is possible that the anticipated results from this study may assist teachers at *(name of School)* and beyond to better their understanding of using iPads to support student learning in reading. It is also possible that this study may be adapted for publication in an academic journal or used as the basis for a presentation after the thesis is completed. If required, I am willing to present the findings from my research with the staff if you see it as being beneficial to the schools' self-review and specific planning processes.

You can at any time withdraw your participation in the research, without reason, and can do so through writing or informing me verbally. If you have any questions you would like answered regarding any aspect of this study, please do not hesitate to call or email me via the contact details below. If you have any concerns about the way in which the study is being conducted, please contact me initially. If subsequent to this meeting you are still not satisfied, please contact my supervisor, Dr Nigel Calder via the contact details below.

Thank you for your informal agreement to allow the selected reading students participation in this study. If upon reading this information letter, you are still content in proceeding with the research, then please sign and return the informed consent form below. I am looking forward to working with you on this project.

Many thanks

Monique Roser

Researcher: Mrs. Monique Roser
Phone: xxxxxxxxxx
Email: xxxxxxxxxxxxxxxxxxxxx

Senior Lecturer: Dr Nigel Calder
Phone: xxxxxxxxx ext. xxxx
Email: xxxxxxxxxxxxxxxxxxxxx

Appendix B: Potential research participation information

PARENT INFORMATION REGARDING INTENDED READING COMPREHENSION STUDY

Date

Dear Parent/Guardian,

Your child is invited to participate in a research project conducted by Mrs. Monique Roser, a Master of Education student at the University of Waikato, and former *(name of school)* teacher who is currently on leave.

The purpose of this research project is to explore the possible influence iPads have on student achievement and perceived learning and engagement in reading. The research project will require your child to participate in a formal one-on-one, pre-test facilitated by myself, the researcher. Should you provide consent, your child will then participate in one of two set reading programmes taught by either *(name of teacher)* or *(name of teacher)*, for a period of 5 weeks during term 2. At the conclusion of the reading programme your child would then be asked to complete a post-test in the same manner as the pre-test above. It is acknowledged that both tests are standardized and the data generated from both tests will be analysed by the researcher with reference to the principal aim of the study. On completion of the reading unit, children will also be requested by the researcher to complete a short survey relating to their personal perceptions of how well they learnt and how well they engaged during the unit. Your child may also be selected to participate as part of a randomly selected group interview, to discuss these learning and engagement perceptions in more detail. Data from the interviews will be collected via a digital note taker.

Your child was selected as a possible participant in this study due to their school age, current reading level and if applicable, access to an iPad. Care has been taken to ensure that there is minimal interruption to the participant's daily timetable. The study is to be incorporated into the two reading classes during the usual three timetabled reading sessions throughout the week. Research will conclude in the last week of term 2. The study does not affect any of the other subjects the students engage in, nor will it require any direct activity from your child outside of school hours.

The principal *(name)* has agreed for me to undertake this research at *(name of school)* and assurance is given that your decision for your child to participate or not will not impact in your son/daughters future education. It is important to note that although parental/guardian consent is needed for research participants under the age of 18, your child will not be able to participate

in the research unless they understand the nature of the research project and consent to participating as well.

Any personal information that can be used to identify your child will remain confidential and will not be given to the staff unless your permission is given, or required by law. Data identifying your child personally will be destroyed at the conclusion of the research project, unless you state in the signed agreement that you are willing for your child's teacher to view the academic data. Pseudonyms will be used to protect the student participants' identities in the analysis of the interview data. As the researcher, I will strongly endeavour to maintain your child's confidentiality throughout the research but cannot guarantee complete confidentiality. All data obtained through the research will be kept in a secure, locked location for five years after the completion of the research project, in accordance with the University of Waikato's *Ethical Conduct in Human Research and Related Activities Regulations 2008.*

The primary purpose of this study will be used to write a thesis to be submitted for a Master of Education degree at the University of Waikato. A digital copy of the Masters' thesis will be stored permanently at the University and, therefore, will be accessible for the public to read. It is also anticipated results from this study will assist teachers at *(name of School)* and beyond to better understand the influence iPads have to support student learning, achievement and engagement. They may also be used in some publications to be submitted to academic journals and/or academic texts.

This research project has been approved by the University of Waikato's Faculty of Education Ethics Committee. Any questions about the ethical conduct of the research may be directed to me. If I am unable to adequately address your questions or concerns, I will consult my supervisor before replying to you directly.

I hope your child is able to participate in this study. If you agree to this, please sign the attached consent form, and along with the consent form provided for your child to sign, return both forms to your child's form teacher. You can at any time withdraw your consent for your child to participate, without reason, and can do so through writing or telling the researcher verbally. If you have any questions you would like answered regarding any aspect of this study, please do not hesitate to call or email me at the contact details below. If you have any concerns about the way in which the study is being conducted, please contact me initially. If subsequent to this meeting you are still not satisfied, please contact my supervisor, Dr Nigel Calder via the contact details below.

Many thanks and kind regards

Mrs. Monique Roser

Researcher: Mrs. Monique Roser

Phone: xxxxxxxxxxx

Email: xxxxxxxxxxxxxxxxxxxxx

Senior Lecturer: Dr Nigel Calder

Phone: xxxxxxxxx ext. xxxx

Email: xxxxxxxxxxxxxxxxxxxxx

Appendix C: Text of student consent form

STUDENT INFORMATION AND PARTICIPANT AGREEMENT

Dear *(name),*

My name is Monique Roser and I am a researcher at Waikato University. During the 9 weeks of term 2, at times I would like to work alongside you during your reading lessons with either *(name)* or *(name)*. I would like to work with you on a small, short reading pre-test (like a probe test that you will have done earlier in the year with your teacher) at the start of the term, followed by a similar post-test at the end of the term.

During your term 2 reading programme you may or may not be using iPads during your lessons. All of your reading sessions will be taught by your reading teacher for term 2 (either *(name)* or *(name)*). The only time I will need to see you is during the pre-test, the post-test and to get you to fill out an easy quick survey at the end of the term. Lastly, I may ask you and other students in your class a few questions as a group, about your thoughts on what you felt you learnt in reading in term 2 and your views and interest levels during the reading unit, while I record/write your responses on a digital recording device.

I would like your permission to record your pre-test and post-test reading level results, as well as the other information you provide me with in the survey and during the interview. I will not be interrupting your normal reading programme and you will not be asked to do any extra reading work from me outside of school.

If you have any questions about any of this, please talk to me when I visit your class or if you do not want to take part in it anymore, you just have to tell me.

If you would like to join this project please write your name, tick the boxes, sign the bottom of this page and return the slip to your form teacher.

Thank you

Monique Roser

STUDENT CONSENT FORM

Name: _____

I give permission for

- **Monique to take me for a short pre and post-test for reading** ☐
- **Monique to record and obtain data from my pre and post test** ☐
- **Monique to interview me as part of a group (with others from my class) about what I think about my learning and engagement in the reading class** ☐
- **Monique to use all forms of information that I provide e.g. from tests, surveys and interviews for her research** ☐

Signed _____*(student)*

Appendix D: Principal/ Teacher consent form

PRINCIPAL & TEACHER PARTICIPATION IN READING COMPREHENSION RESEARCH

- **We agree to the small-scale research project, as outlined in the introductory letter, to be conducted at *(name)*.**

- **We understand that our participation is voluntary and that we are able to withdraw from the research at any time and the data, up until the commencement of analysis, without giving a reason.**

- **We would like to be directed to the University of Waikato's Research Commons database to view an electronic copy of the thesis once it is completed.**

_____ _____ _____

Principal **Date** **Signature**

_____ _____ _____

Teacher **Date** **Signature**

_____ _____ _____

Teacher **Date** **Signature**

Contact Details

Researcher: Mrs. Monique Roser

Phone: xxxxxxxxxx

Email: xxxxxxxxxxxxxxxxxxxx

Senior Lecturer: Dr Nigel Calder

Phone: xxxxxxxx ext. xxxx

Email: xxxxxxxxxxxxxxxxxxxx

Appendix E: Parental/Guardian consent form

PARENT/GUARDIAN CONSENT FORM FOR PARTICIPATION IN READING

I have read the information sheet regarding the iPads, achievement and perceived learning and engagement in reading, research project being undertaken at Bethlehem College, and I allow my child to participate in the study in the following ways (please circle):

- **I confirm that I have read and understand the information sheet for the research project and have had the opportunity to ask questions** **YES/NO**
- **I agree for my child to take part in the research project as outlined in the information sheet** **YES/NO**
- **I agree to statistical data being collected from my child in the form of standardized pre and post reading tests** **YES/NO**
- **I agree to data being collected from my child through a survey and as part of a group interview** **YES/NO**
- **I agree to the use of anonymous quotes in publications** **YES/NO**
- **I understand that the results of the study may be used in academic publications or presentations, but that no identifying quotes or data relating to my child will be used in any such publication or presentation.** **YES/NO**
- **I understand that my child's participation is voluntary and that I am able to withdraw my child at any time and their data up until the commencement of analysis, without providing a reason** **YES/NO**
- **I allow my child's reading and/or form class teacher to view their statistical results from the pre and post reading tests produced during the study** **YES/NO**
- **I wish to be directed to the University of Waikato's Research Commons database to view an electronic copy of the thesis once it is completed.** **YES/NO**

Name of Child_____ Form class _____

Appendix F: Interview questions

FOCUS GROUP INTERVIEW STARTER QUESTIONNAIRE

Questions relating to prior knowledge of engagement & what it 'looks' like:

- What does being 'engaged' in class activities mean to you?
- What does a student who is engaged in a reading class/activity look like? How do they act?

Questions relating to students perceived engagement throughout the reading unit/study

- On a scale of 1-5 with 5 being the best and 1 being the worst, how would you rate your participation in class throughout the past 5 weeks of the reading unit?
- Using the same scale (as above), how would you rate your overall enjoyment of the class activities you participated in, during the reading unit?
- Looking back on this list of reading activities you may have participated in these past 5 weeks, which activities did you enjoy the most and what made them enjoyable?

Questions relating to students perceived learning throughout the reading unit/study

- How do you think you learn the best? Visual (seeing) presentations, listening to the teacher or kinaesthetic (doing)?
- Do you learn more when you are working by yourself, with a pair or in a small group (3- 5 people). Why do you think this is?
- Did you think the reading unit/activities supported you and the way you learn best?
- Did the reading activities support your learning and understanding of the novel? If yes how, if not why not?

Questions relating to students' opinion on improving/changing the reading unit

- What changes would you like to see in your reading class to help support the way you like to learn and/or learn best?
- Do you think that students are inclined to learn more if they enjoy and activity? Why or Why not?

Questions asked of the focus group where participants had access to iPads

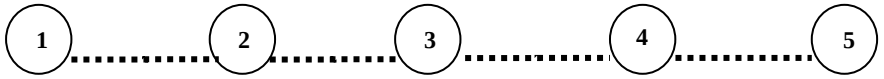
- Do you think that using an iPad as an e-reader helps you read better/more? How?
- What features does the iPad as an e-reader possess that traditional printed text doesn't?
- Which of these features did you use the most during the unit?
- Can iPads help students who don't normally like reading novels, enjoy them more? How?
- Do you think the iPad can help engage students in set reading activities more? Why? Why not?
- In what ways was the iPad not of use to you during the activities?
- Can iPads help students learn better in reading? Why or why not?

Appendix G: Survey questions- Treatment Participants

SEMI-STRUCTURED SURVEY QUESTIONNAIRE FOR TREATMENT PARTICIPANTS

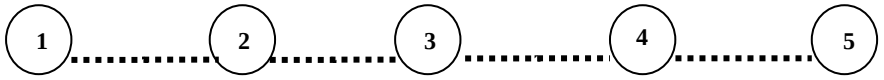
Questions relating to Students' perceived learning:

1) I enjoyed using the iPad as an e-reader when reading the set novel
(Circle one number)



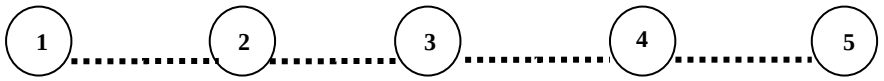
Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

2) I found it easy to navigate the iPad when using it as an e-reader
(Circle one number)



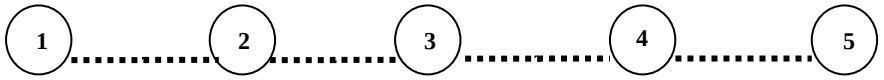
Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

3) The iPad activities helped me learn the unit content (Circle one number)



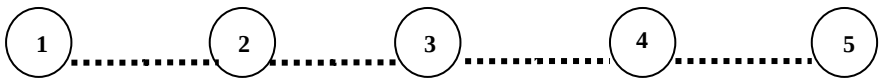
Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

4) The iPad activities helped me to connect ideas in new ways
(Circle one number)



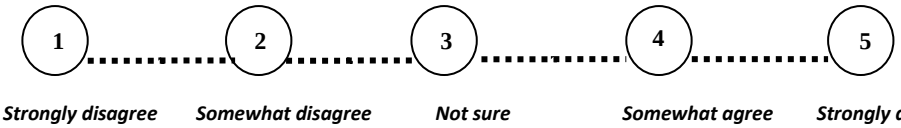
Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

5) The iPad activities helped to enhance my learning (Circle one number)

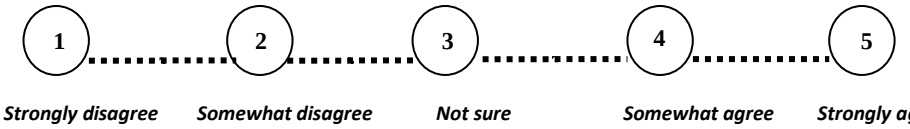


Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

6) The iPad activities helped me develop confidence in my reading
(Circle one number)



7) The iPad activities helped me to develop skills to enhance my reading comprehension (Circle one number)



Questions relating to Students' perceived engagement:

8) Using an iPad in reading motivates me to learn the course material more than reading activities that do not use the iPad (Circle one face)

9) I participated more in class during the iPad activities than during activities that do not use the iPad (Circle one face)

10) My attention to the tasks was greater when using the iPad

(Circle one face)

Strongly disagree ***Somewhat disagree*** ***Not sure*** ***Somewhat agree*** ***Strongly agree***

11) It was easier to work in a group using the iPad than in other group activities (Circle one face)

Strongly disagree ***Somewhat disagree*** ***Not sure*** ***Somewhat agree*** ***Strongly agree***

Unstructured questions:

12) Would you recommend other students use an iPad to read a novel over traditional printed text books? Why or why not?

13) What features (if any) did you find helpful on the iPad when using it as an e-reader?

14) List up to 3 ways that an iPad when used as an e-reader may assist you with your reading compared with that of a traditional printed text book.

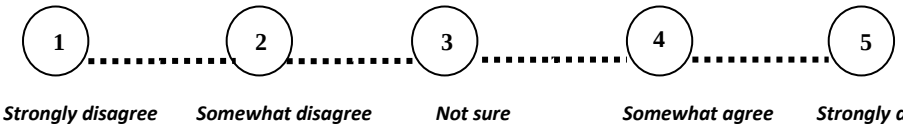
15) List up to 3 things that you found difficult when using the iPad as an e-reader

Appendix H: Survey questions- Control Participants

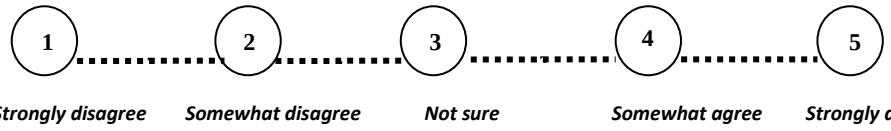
SEMI-STRUCTURED SURVEY QUESTIONNAIRE FOR CONTROL PARTICIPANTS

Questions relating to Students' perceived learning:

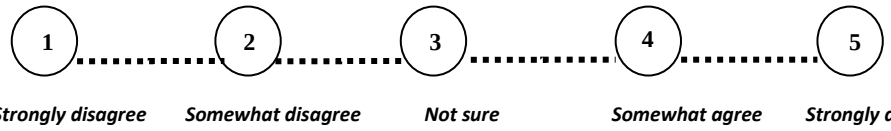
1) I enjoyed using a printed text book when reading the set novel
(Circle one number)



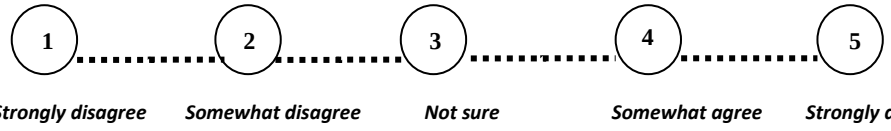
2) I found the print easy to read (Circle one number)



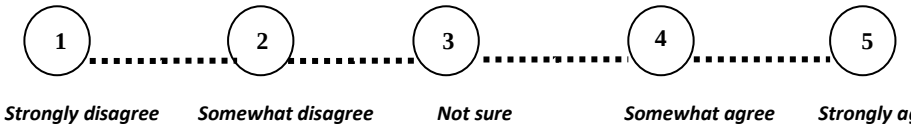
3) The writing activities helped me learn the unit content (Circle one number)



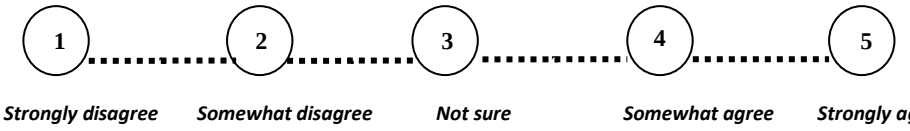
4) The writing activities helped me to connect ideas in new ways
(Circle one number)



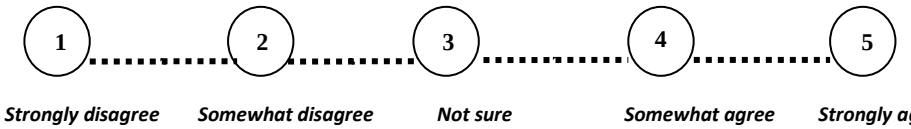
5) **The writing activities helped to enhance my learning** (Circle one number)



6) The writing activities helped me develop confidence in my reading (Circle one number)



7) The writing activities helped me to develop skills to enhance my reading comprehension (Circle one number)



Questions relating to Students' perceived engagement:

8) I was motivated to learn during the 'Hatchet' reading unit
(Circle one face)

9) I participated more in the Hatchet unit compared with previous novel studies (Circle one face)





Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

10) I remained focused in completing the set tasks throughout the unit (Circle one face)





Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

11) I would have preferred to work as part of a group or pair to complete the Hatchet activities (Circle one face)





Strongly disagree *Somewhat disagree* *Not sure* *Somewhat agree* *Strongly agree*

Unstructured questions:

12) Would you recommend that other students use an iPad or to use a traditional print based novel to read the story Hatchet? Why/why not?

13) List up to 3 things you liked about the book 'Hatchet'

14) List up to 3 things that you disliked about the book 'Hatchet'